Submitted to:
US EPA Region 8
Denver, CO

Submitted by:
Atlantic Richfield Company
La Palma, CA
September 2013

1290044

Solids Repository Alternatives Evaluation and Preliminary Design Report

Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU1
Rico, Colorado

Atlantic Richfield Company

Atlantic Richfield Company

4 Centerpointe Drive, 4-435
La Palma, CA 90623
Direct: (714) 228-6770
Fax: (714) 228-6749
E-mail: Anthony.Brown@bp.com

September 30, 2013

VIA EMAIL AND HAND DELIVERY

Mr. Steven Way
On-Scene Coordinator
Emergency Response Program (8EPR-SA)
US EPA Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Subject: Solids Repository Alternatives Evaluation and Preliminary Design Report
Rico-Argentine Mine Site – Rico Tunnels
Operable Unit OU01 Rico, Colorado

Dear Mr. Way,

A digital file in PDF format of the Solids Repository Alternatives Evaluation and Preliminary Design Report Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01 Rico, Colorado, dated September 30, 2013, is being submitted to you today via email. Three (3) hard copies of the report will also be hand-delivered to your office no later than October 1.

Atlantic Richfield Company (AR) is submitting this report responsive to requirements in Task C of the Removal Action Work Plan accompanying the Unilateral Administrative Order for Removal Action, Rico-Argentine Site, Dolores County, Colorado, U.S. EPA Region 8, Docket No. CERCLA-08-2011-0005.

If you have any questions, please feel free to contact me at (951) 265-4277.

Sincerely,

Anthony R. Brown
Project Manager
Atlantic Richfield Company

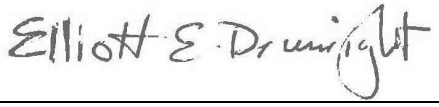
cc: Ronald Halsey, Atlantic Richfield Company (via e-mail)
Terry Moore, Atlantic Richfield Company (via e-mail)
Sheila D'Cruz, Atlantic Richfield Company (via e-mail)
Reginald Ilao, Atlantic Richfield Company (via e-mail and hardcopy)
Jan Christner, Weston Solutions, Inc. (via e-mail)
William Duffy, Esq., Davis, Grahm & Stubbs, LLP (via e-mail)
Adam Cohen, Esq., Davis Graham & Stubbs, LLP (via e-mail)
Sandy Riese, EnSci, Inc. (via e-mail)
Tom Kreutz, AECOM Technical Services, Inc. (via e-mail)
Doug Yadon, AECOM Technical Services, Inc. (via e-mail)
Chris Sanchez, Anderson Engineering Company, Inc. (via e-mail)
Kristine Burgess, AEEC, LLC (via e-mail)
Marc Lombardi, AMEC Environment & Infrastructure, Inc. (via e-mail)
Spencer Archer, AMEC Environment & Infrastructure, Inc. (via e-mail)

Submitted to:
US EPA Region 8
Denver, CO

Submitted by:
Atlantic Richfield Company
La Palma, CA
September 2013

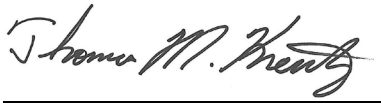
Solids Repository Alternatives Evaluation and Preliminary Design Report

Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01 Rico, Colorado



Prepared By Elliott D. Drumright, PE
Senior Geotechnical Engineer

Reviewed By Douglas M. Yadon, PE
Certifying Engineer



Released By Thomas M. Kreutz, PE
Project Manager

Contents

List of Appendices

List of Tables

List of Figures

List of Acronyms

AECI	Anderson Engineering Company, Inc.
AECOM	AECOM Technical Services, Inc.
amsl	above mean sea level
AR	Atlantic Richfield Company
ASTM	American Society for Testing and Materials
bgs	below ground surface
CD	Certificate of Designation
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CPT	Cone Penetrometer Test
cy	cubic yard
DLUA	Dolores County Land Use Application
ED&OP	Engineering Design and Operations Plan
FS	Factor of Safety
HMWMD	Hazardous Materials and Waste Management Division
IDF	Interim Drying Facility
ksf	kips per square foot
NSR	North Stacked Repository
pcf	pounds per cubic foot
PDF	Permanent Drying Facility
PDR	Preliminary Design Report
psf	pounds per square foot
RAWP	Removal Action Work Plan
ReMi	Refraction Microtremor
SLT	St. Louis Tunnel
SPT	Standard Penetration Test
SSR	South Stacked Repository
SWMMP	Solid Waste and Materials Management Program
UAO	Unilateral Administrative Order
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USGS	United States Geological Survey

1.0 Introduction

This Preliminary Design Report (PDR) has been prepared by AECOM Technical Services, Inc. (AECOM) on behalf of Atlantic Richfield Company (AR) and presents the preliminary design for a solids repository to be constructed at the St. Louis Ponds site near the Town of Rico in Dolores County, Colorado (Figure 1).

This Preliminary Design Report is organized as follows:

- Section 1.0 presents the purpose of the work in the context of the United States Environmental Protection Agency (USEPA) Unilateral Administrative Order (UAO) (EPA, 2011a) and accompanying Removal Action Work Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU1, Rico, Colorado dated March 9, 2011 (RAWP) (USEPA, 2011a), plus general site conditions.
- Section 2.0 discusses geologic mapping completed for the overall St. Louis Ponds area, which includes each of the alternative repository locations; general subsurface geology (overburden and bedrock); the various geotechnical investigations completed over time in the alternative repository locations; and selected laboratory results applicable to the solids repository design.
- Section 3.0 presents the repository alternatives and a recommendation for the preferred alternative location.
- Section 4.0 includes a discussion of primary criteria for design of the solids repository at the recommended location, including capacity and phasing considerations, stormwater and leachate control, and geotechnical considerations (bearing capacity, slope stability and settlement).
- Section 5.0 includes a schedule and discussion of the repository design and permitting process.

1.1 Purpose

This PDR has been prepared pursuant to the USEPA UAO and in accordance with Task C of the RAWP. The Solids Repository Project specifically addresses Subtasks C1 and C2 of Task C, “Design and Construction of a Solids Repository”.

The proposed repository site is located within the Ponds/St. Louis Adit area of the Rico – Argentine Mine Site, approximately 0.75 miles north of the northern boundary of the Town of Rico in Dolores County, Colorado. The site lies at the base of Telescope Mountain approximately 500 feet east of the Dolores River. This location is in the NW1/4 of the NW1/4 of Section 25, T40N, R11W within the United States Geological Survey (USGS) Rico 7.5-minute Topographic Quadrangle. The proposed repository will be located in an area of historic mining and mineral processing.

The project advances the overall site strategy by providing a repository for the existing and potential future mine water treatment solids (and potentially other mining or mineral processing by-products on site) while satisfying the following criteria:

- Adequate storage (airspace) for present and future solids and/or other by-products assuming a 50-year operating period.
- Safe location with regards to both access, and potential groundwater intrusion and contamination.
- Long-term geotechnical stability and erosion protection.

Refer to the following documents for specifics on the Solids Repository Project’s applicability to the overall site strategy:

- Removal Action Work Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU0, Rico, Colorado; issued by EPA to Atlantic Richfield Company March 9, 2011 (EPA, 2011b).
- Initial Solids Removal Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado; submitted by Atlantic Richfield Company to EPA May 2, 2011 (AR, 2011).
- Pond 15 Solids Removal Work Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado; submitted by Atlantic Richfield Company to EPA, August 3, 2012 (AR, 2012).
- 2013 Solids Removal Work Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado; submitted by Atlantic Richfield Company to EPA May 13, 2013 (AR, 2013).

The solids repository will provide a permanent, on-site disposal area for: existing solids present in upper ponds (18, 15, 14, 13, 12 and 11); solids currently being stored in the Interim Drying Facility (IDF); and future solids generated from either a lime-addition treatment system or depleted matrix from operation of a wetlands treatment system, or other technology, whichever is selected for mine water treatment at the Site. At full build-out, the recommended repository location would provide additional and/or alternative capacity for disposal of other existing or potential future by-products including calcines up to the planned maximum capacity of 337,000 cubic yards (cy). As noted previously, this capacity would accommodate all existing and estimated future by-products (excluding waste rock) assuming wetlands treatment. Quantities are further discussed in Section 3.0. The repository will be designed, constructed and operated to comply with the requirements of the USEPA RAWP, Colorado Department of Public Health and Environment (CDPHE) Solid Waste and Materials Management Program (SWMMP)/Hazardous Materials and Waste Management Division (HMWMD) and Dolores County, including acquisition of a Certificate of Designation (CD).

Three primary alternative solids repository locations were evaluated for this report including: 1) South Stacked Repository (SSR); 2) Pond 13: and 3) North Stacked Repository (NSR).

1.2 Siting - General

1.2.1 Topography

The St. Louis Ponds and proposed repository site lie within the southwestern portion of the San Juan Mountains, in part on the lowermost, west-facing colluvial slope of CHC Hill (at the base of 12,208 foot Telescope Mountain) and in part on the adjacent east edge of the original Dolores River floodplain (see discussion of site geology in Section 2.1. The current surface grade at the repository sites evaluated ranges from approximately 8810 to 8910 feet above mean sea level (amsl). Relief within the alternative sites varies from approximately 20 to 80 feet. The existing ground ranges from essentially flat lying to sloping at a maximum of approximately 2H:1V, overall to the west. The lowest existing elevation is approximately 20 feet above the elevation of the Dolores River. The existing ground surface has been altered by grading (both excavation and filling) over most of the alternative site areas. The major grading is believed to have occurred as part of railroad construction in the late 19th century and active mining and mineral processing operations, mainly in the first half of the 20th century. Some additional grading is known to have occurred more recently, including grading to provide access roads for subsurface investigation activities in 2011-13.

1.2.2 Climate

Climate is characterized as semi-arid with long, cold snowy winters and short, moderately wet and warm summers. Monthly and annual climatic data has been compiled by the Colorado Climate Center at Colorado State University for Rico station 57017 from 1893 through 1993. The mean annual temperature is 38.7ºF. The warmest months are June, July, and August with monthly mean temperatures of about 55ºF. The coldest months are December, January and February with monthly mean temperatures of about 6.5ºF.

Mean annual precipitation in the Rico area is about 27 inches. Most of this precipitation occurs as snowfall in the fall, winter and early spring, averaging about 173 inches per year. Average monthly precipitation

ranges between about 1.4 and 2 inches, with June the driest month and July and August the wettest months with almost 3 inches on average. The driest fall month is November with about 2 inches on average.

1.2.3 Access

The proposed repository site is accessed via approximately 0.75 mile of an existing unimproved gravel road extending east and north from Colorado State Highway 145. Highway 145 provides access from Telluride (27 road miles) and Montrose (86 road miles via US Highway 550 and then State Highway 62) to the north, and from Cortez (50 road miles) and Durango (92 road miles via US Highway 160) to the south.

2.0 Field Investigations and Laboratory Testing

Extensive field geologic and geotechnical investigations and geotechnical laboratory testing have been completed at the St. Louis Ponds site over the past several decades including investigations specific to the solids repository during the past two years. These investigations were performed for a variety of purposes and cover essentially all of the ground and conditions in the Ponds area. The results of these prior investigations that were specific to characterization of potential repository sites and/or that were performed for other reasons in potential site areas are discussed in detail in this Section 2.0. This information provides a key basis for the identification, characterization and evaluation of final candidate repository sites and recommendation of a preferred site as discussed in Section 3.0.

2.1 Geologic Mapping

In 2011, a site reconnaissance was performed to identify and map surficial materials (fill, colluvium, and landslide deposits), and major bedrock units that occur in the vicinity of the project site. After review of available, published geologic mapping and reports, a geologic reconnaissance was performed by walking the site and mapping key geologic features, exposures and unit contacts on available topographic maps. The results are provided on Figure 2. A description and interpretation of the mapped units is provided below.

2.1.1 Bedrock

Bedrock is largely covered in the valley bottom and on the hillslopes within the mapped area by unconsolidated surficial deposits. A detailed description of the bedrock geology of the area is presented in Geology and Ore Deposits of the Rico District, Colorado U.S. Geological Survey Professional Paper 723 (McKnight, 1974). Two principal bedrock types were delineated within the area: Precambria greenstone (map symbol g) and Paleozoic Hermosa Formation (map symbol Phl).

The oldest rocks in the area are Precambrian-age greenstones that are metamorphosed, mafic igneous rocks. These rocks occur in a narrow, east-west belt that crosses the river near the highway bridge in the southern portion of the mapped area. According to McKnight, this belt of rocks is actually an upthrusted fault block bounded by the Smelter fault on the south and the Last Chance Fault on the north. The fault block occurs at the central axis of a broad structural feature known as the Rico Dome.

The lower member of the Paleozoic Hermosa Formation crops out as a discontinuous ledge in the slope on the east side of the valley, including on CHC Hill. The Hermosa Formation is a thick sequence of interbedded sandstone, shale, conglomerate, limestone and dolomite that is the predominant geologic unit within the Rico district. The Hermosa Formation sequence is intruded by Tertiary age igneous rocks that were not mapped separately. The intrusives are predominantly a hornblende latite porphyry that occurs as a complex pattern of sills and dikes within the Hermosa formation.

2.1.2 Landslide Deposits

Landslide deposits occur in the hillslope on the east side of the river valley (northeast portion of the mapped area). The landslide deposits were classified based on the relative age of movement: active landslide deposits (map symbol Qlsa), and older landslide deposits (Qlso). Active or potentially active landslides (Qlsa) include slope failures that exhibit evidence of movement during last few years. Older landslide deposits are characterized by large, deep-seated landslide complexes that do not exhibit geomorphic features suggestive of recent movement (last several decades).

An older landslide deposit occurs in the northeast corner of the mapped area. This landslide deposit is part of a much larger landslide complex that covers approximately one square mile on CHC Hill. This landslide, herein referred to as the CHC Hill landslide, was mapped and described in USGS reports for the area (Walcott 1900, and McKnight 1974). Immediately north of the site, westward movement of the CHC Hill landslide controls the position of the Dolores River. In this area, the river is confined between the toe of the landslide on the east and the base of Sandstone Mountain on the west.

A smaller active landslide (Qlsa) also occurs in the northeastern corner of the mapped area. This landslide has developed within the larger, deeper CHC Hill landslide and represents local reactivation of the toe of the larger ancient slide mass. The active slide extends approximately 500 feet from head to toe and ranges from 200 to 300 feet in width. This landslide exhibits evidence of recent slump and debris slide activity. The slide has a relatively fresh main headwall scarp, and fresh secondary minor scarps; and several slump block features in the upper portion of the slide; and active debris slide features in the lower portion of the slide mass. All of these features suggest that the slide is active and poses a high risk to any facility situated at the toe of the slope. The mechanism that triggered reactivation of the slide is unknown, although grading and excavation evident at the toe of the slope in this area may have contributed to slope destabilization and reactivation of a portion of the slide mass.

A preliminary geologic reconnaissance was conducted in the central and upper portions of the CHC Hill landslide east of the mapped area. The purpose of the reconnaissance was to look for indication of recent movement of the larger landslide mass. Overall, the CHC Hill landslide deposit located immediately east and upslope of the mapped area did not exhibit evidence of movement in the past several decades. Most of this area is densely vegetated with mature aspen and fir trees. It is also traversed by primitive dirt roads that have existed since the early 1900s. There is also a relatively large waste rock pile associated with the historic Mountain Springs Mine situated in the lower central portion of the slide. If the CHC Hill landslide had experienced significant movement in the past few decades one would expect to see geomorphic evidence such as disrupted vegetation, roadways, and mine waste piles situated in the central portion of the slide mass. None of these types of features were observed during the reconnaissance suggesting that the larger CHC Hill landslide has not experienced significant movement in the past several decades or more. There are, however, localized active landslide deposits within the CHC Hill landslide area (like the one described above in the project area) where localized portions of the slide have been reactivated. These were observed locally in the upper portion of the CHC Hill landslide.

It is likely that the primary deep-seated movement in the CHC Hill landslide originally formed under the wetter climatic conditions in the late Pleistocene. These older landslide deposits can become reactivated as the result of natural and human surface disturbance (e.g., clearing vegetation, excavating the toe of slopes, modifying the drainage pattern, or rising groundwater levels).

2.1.3 Unconsolidated Surficial Deposits

Alluvium (map symbol Qal) (unconsolidated materials deposited by streams and rivers) occurs along the active Dolores River floodplain. Alluvium consists of predominantly coarse-grained deposits of silt, sand, pebbles, cobbles and boulders up to a couple feet in diameter. The rock clasts are of variable lithologies and generally subrounded to well rounded in shape.

Colluvium (map symbol Qc) forms by the downslope movement of soil and rock on moderate to steep slopes under the influence of gravity and sheet flow processes. The slopes that bound the east side of the St. Louis Ponds area are generally covered by extensive colluvial deposits that conceal the underlying bedrock. The thickness of these deposits tends to increase in the lower portion of the slope where the colluvium accumulates as a wedge of material resting on the valley floor. The colluvium is covered by patchy soil and vegetation. The colluvium consists of a mixture of coarse talus and material accumulated by slope wash, soil creep, and shallow, localized landslide processes.

Most of the valley floor area situated east of the Dolores River is covered by various types of fill material or native materials that have been disturbed by grading. Alterations in the surface geomorphology were used to identify areas covered by several feet or more of fill or disturbed by grading. The fill deposits were classified into three primary types based on visual observations: Undifferentiated fill (map symbol F), mine waste including calcines (map symbol MW), and riprap (map symbol RR). Riprap occurs along two separate and distinct dike structures that separate the Ponds area from the Dolores River. One of the dikes extends for approximately 1,100 feet and consists of angular boulder (map symbol RR1). The other dike extends only approximately 400 feet and only occurs in the northwest portion of the site. This dike consists of rounded boulders that appear to be derived locally from the river bed.

2.2 Geotechnical Investigations

Geologic and geotechnical conditions at the overall St. Louis Ponds site were investigated by geologic reconnaissance and preliminary mapping, field exploration (including monitoring wells, exploratory borings and test pits), and limited geotechnical laboratory testing on a number of occasions from 1981 to 2008. This included work performed by Dames and Moore (1981), Anderson Engineering Company, Inc. (AECI) (1996; 2008), Short Elliott Hendrickson Inc. (2001; 2004), and CDPHE (2003). Subsequent exploration (borings, monitoring wells, cone penetrometer test (CPT) probes, test pits and surface geophysical Refraction Microtremor [ReMi] lines) was completed by AECI/AECOM in 2011, 2012 and 2013 (in-progress). The locations of those exploration features proximate to the alternative repository locations are included in Figure 3. The field or final logs of the exploration features (older and recent) are included in alphabetical order by type (borings, probes, monitoring wells, test pits and ReMi lines) in Appendix A.

The pre-2011 investigations were performed for a variety of specific purposes, to varying standards, and details of the work performed are only partially known. The 2011-13 investigations were performed for the purpose of identifying subsurface conditions in the areas of potential solids repository locations and are discussed in detail herein. For purposes of design, where differing interpretations are possible utilizing the prior information as compared to the recent (2011-13) information, greater weight is generally given to the more recent results.

The objective of investigating the alternative repository locations was to characterize the repository subgrade, including acquiring information to evaluate foundation bearing capacity, settlement, depth to groundwater (relative to placement of a liner system), and the characteristics of potential borrow material from the base excavation.

2.2.1 Drilling

For the 2011 to 2013 investigations, boreholes were and are being drilled to target depths (or refusal if encountered shallower) specified in the *Field Sampling Plan for Solids Repository, Permanent Drying Facility and Pond Flood Dike and Embankment Improvements* (AR, 2011), *Supplement to Field Sampling Plan for Solids Repository, Permanent Drying Facility, and Flood Dike and Pond Embankment Improvements, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado* (AR, 2012), and *2013 Supplement to the Field Sampling Plan, Rico-Argentine Mine Site - Rico Tunnels, Operable Unit OU01, Rico, Colorado* (AR, 2013).

Drilling was accomplished with conventional mud-rotary and sonic drilling equipment. Mud-rotary drilling utilizes temporary surface casing, hollow drilling rods connected to a rotary drilling bit, and a prepared bentonite/water drilling fluid to flush the drill cuttings and maintain borehole stability during drilling and sampling. If required, rock coring is then completed using a temporary casing extended to the surface of rock, and diamond-tipped core barrels, usually aided with clean water to cool the bit and flush rock cuttings.

Sonic drilling uses high-frequency, resonant energy to advance a core barrel and casing into subsurface soil units. The resonant energy is transferred down the drill string to the bit while the drill string is rotated,

distributing the energy and impact at the bit face. Sonic drilling is able to penetrate through large cobbles and boulders so refusal is not typically an issue. The sonic drilling method advances a casing as the borehole is drilled, and generally produces a continuous core sample. The sample is released into long, cylindrical casing bags, preserving the in-situ moisture content. Core loss with sonic drilling can occur if loose, unconsolidated soils are densified by the sonic energy, or if in situ soils are redistribured into voids.

Where access was convenient, wheel-tired drill rigs were used; where access was more difficult or bearing capacity a consideration, track-mounted equipment was used. Each rig type was generally capable of drilling deep and penetrating the rocky soils on the site, including the shallow cobbly alluvium and colluviums, although some refusal was encountered on deeper boulders or rock debris in the colluvium/alluvium. Both types of rigs were equipped to run the Standard Penetration Test (SPT), and push/recover Shelby tube samples of softer cohesive materials where encountered. Note, however, that it was not feasible to flood the sonic drill string with heavy drilling fluid to counteract otherwise unbalanced groundwater pressures at the drill bit that were encountered below the water table in several holes. This resulted in locally significant heave of fine-grained granular (non-plastic) soils into the core barrel such that reliable SPTs were not possible at those locations.

The borings were logged by a professional geotechnical engineer or geologist in general accordance with the guidelines in the *Engineering Geology Field Manual* (USBR, 2001). The logs included information on: drilling equipment used; difficult or problematic conditions; depth of changes in horizons or materials encountered, including color, gradation, soil classification, plasticity, density or moisture; and other features such as roots, debris, fissures, voids, staining, etc. If encountered, the depth to groundwater was noted. The sonic cores of overburden and the rock cores from mud-rotary/rock coring were photographed or videotaped, and representative samples collected of each soil horizon (except minor horizons generally thinner than about one foot thick) in sealed buckets or sample bags. Separate samples were collected and sealed in ziploc plastic bags to preserve in situ moisture content. Those samples were transported to the geotechnical laboratory for testing as described in Section 2.4. Shelby tube samples were capped and sealed with duct tape in the field, waxed and crated for transport to the laboratory.

In areas with near-surface fill, SPTs using a standard 2-inch outside diameter split spoon and SPT method per American Society for Testing and Materials (ASTM) D1568 were generally collected every 2.5 feet until alluvium was encountered, and then every 5 feet to the bottom of hole refusal, whichever was shallower. In other areas, SPTs were generally collected every five feet as conditions permitted.

Boreholes were completed as monitoring wells as described below or formally closed (abandoned) as noted on the boring logs. For piezometer completions, standard 2-inch Schedule 40 polyvinyl chloride standpipe wells were installed, utilizing 0.010 inch screened (factory-slotted) intervals as noted on the logs. Boreholes not completed with piezometers were abandoned with Halliburton Holeplug 3/8" bentonite pellets and hydrated.

2.2.2 Monitoring Wells

Monitoring wells were completed either within the proposed repository footprints, or, in the case of South Stacked Repository (SSR)-A and Pond 13 locations, near the periphery through nearby pond embankments, to further characterize groundwater conditions at the site. Certain of the pond embankment wells were logged, sampled and completed in pairs, with separate deep "D" and shallow "S" screened intervals. The deep wells were screened in the coarse alluvium to assess conditions in the alluvial aquifer. The shallow wells were bored approximately five feet away from the deep wells and were completed in either the dike fill or in a unit above the alluvium to assess the seepage characteristics of the dike or other shallow stratum as appropriate. Screened intervals (with additional buffer above and below) were backfilled with 20-40 Silica Sand and the remainder of the hole backfilled with Halliburton Holeplug 3/8" bentonite pellets and hydrated. Most monitoring wells were completed with concrete surface pads and locking well covers; others have a

riser pipe with locking cover. After installation, the wells were developed using portable pumping equipment to flush cuttings and sediment from the screened interval to the extent practical.

2.2.3 Test Pits

In 2011 and 2012, test pits were completed typically using tracked excavators, depending on test pit location and accessibility. For narrow pond embankments and flood dikes, or where access was otherwise limited, a "mini-excavator" was used. For test pits within the ponds themselves, including the alternative Pond 13 repository site, a "long-stick" excavator was utilized to provide extended reach. For all other areas, a conventional track-mounted excavator was used. Test pits in earlier vintages of exploration likely used track- or rubber-tire-mounted excavators or backhoes.

Test pits were excavated to refusal or maximum safe reach depth of the excavator, and logged by a professional geotechnical engineer in general accordance with the *Engineering Geology Field Manual* (USBR, 2001). Personnel did not enter the test pits, in compliance with OSHA safety regulations, but pit walls and spoil piles were photographed and horizon depths estimated with a survey rod and/or marked excavator arm. Representative bulk samples were collected of each soil horizon in five gallon buckets (except minor horizons generally thinner than one foot thick); moisture content samples were sealed separately in ziploc bags. Samples were transported to the geotechnical laboratory for testing as described in Section 2.4.

2.2.4 Cone Penetrometer Soundings

In 2011, a total of 17 CPT probes or soundings were completed in the overall St. Louis Ponds area to provide geotechnical information on the softer and fine-grained materials, including the calcines and finer-grained alluvial units that underlie the ponds and pond embankments. Of these, 10 soundings are proximate to the alternative repository locations and are discussed herein. The CPT probes were completed by Gregg Drilling and Testing, Inc. using a Gregg 20-ton track mounted rig.

The CPT measures the total penetration resistance to pushing a tool with an instrumented conical tip into the soil. A friction sleeve on the rod string measures the friction on the side of the string and aids in estimating soil cohesive strength. The CPT cone tip employs a pressure transducer with a filter to gather pore water pressure data. This data are recorded in an electronic log by the operator.

CPT probes are typically suitable for loose to medium dense silts, soft to stiff clays and fine granular materials, and are typically unable to penetrate gravels, cobbles, boulders and other dense strata. To obtain results in the units of interest, most probe locations had to be pre-drilled through rockier units, or existing boreholes were reused to access the target depths. In cases where previously drilled boreholes were re-utilized such as CPT-ED-4, the probe was pushed through the bentonite-backfilled interval borehole to access a loose or softer, underlying stratum.

2.2.5 Geophysics

To supplement the test borings, subsurface conditions in the overall St. Louis Ponds area were and are continuing to be evaluated using the ReMi test. This test measures shear wave velocities of subsurface materials using ambient surface vibrations, with the results not adversely affected by the grain size of the soils. In the ReMi test, a series of 22 to 24 geophones were placed on the ground in arrays on a 10-foot spacing.

Of all locations tested, four array locations (spreads) evaluated in 2011 and one in 2012 were proximate to the alternative repository locations. Vibrations resulting from moving vehicles and other sources were employed to evaluate variations in subsurface strata. Data were recorded in 20 second sample intervals, with a two millisecond sampling rate per channel. Once collected, the data were checked for their fidelity.

To assure that a robust profile was being made, both individual recordings and multiple summed (stacked) recordings were evaluated.

A wave-field transformation data processing technique and an interactive Rayleigh-wave dispersion modeling tool were employed for the spectral analysis of surface waves. By analyzing segments of the geophysical line and integrating the results, two-dimensional profiles were developed along the line arrays. The two-dimensional profiles provide details of the shear wave velocities across the array length to depths on the order of 100 feet (about one-half the total length of the array). It should be noted that due to the nature of the analysis, it is not possible to interpret conditions at the extreme ends of the array. As a consequence, the results omit the outer 50 feet of each array.

The results of the ReMi testing are presented on individual profiles that indicate variations in shear wave velocities along and below the ground surface along the length of the array by means of various colors. Materials with higher shear wave velocities (very dense soil or bedrock) are indicated by red and yellow shades. Very stiff or dense soils are represented by green and light blue shades. Materials with lower shear wave velocities (medium dense and firm soils) are indicated by dark blue shades. Very loose or soft soils with shear wave velocities in the range of 500 to 600 feet per second are indicated by purple and pink shades. It has been found that materials having a shear wave velocity greater than about 650 feet per second are resistant to liquefaction, regardless of the magnitude of the earthquake.

The ReMi tests revealed conditions that were generally consistent with the soil test boring data. However, shear wave velocities interpreted by the ReMi tests were somewhat more uniform than what might be expected from the SPT values (N-values) in strata having a significant percentage of gravel. This is likely due to the amplification of N-values resulting from the presence of the coarsely grained materials. The results of each seismic line are presented in the corresponding subsections for each alternative repository location.

2.3 Field Exploration Results

Three primary alternative solids repository locations were evaluated for this report, including: 1) SSR; 2) Pond 13; and 3) NSR. These locations are shown on Figures 4A and 4B which include two alternatives for the SSR.

2.3.1 South Stacked Repository (SSR)

The SSR area contains several surficial features, including concrete foundations, IDF lime-treatment solids and underlying calcines in the Pond 16/17 area, and a wedge of fill and/or colluvium against the steep hillside to the east. The area is believed to potentially contain buried debris associated with buildings that appear on the lower slope of the hillside in historic photos of the area. Historic photos also indicate that portions of this area (generally the central, middle-elevation area) were utilized as a waste rock dump for the St. Louis Tunnel (SLT) excavation.

In 2011 and 2012, nine boreholes (SSR-1 through -5 and SSR-101 through -104), four monitoring wells (MW-5S/D, MW-101, MW-102 and MW-202), three test pits (TP2011-17 through -19), six CPT probes (CPT-1 through -6) and two ReMi lines (RM-2 and RM-4) were completed within or near the periphery of the full build-out footprint of this repository location as shown on Figure 3. Relevant portions of these explorations are discussed herein. Earlier explorations in proximity include borings B-1 through B-5, EB-1, EB-2 and EB-2D, DH-11 and DH-12R, monitoring wells GW-5 through GW-8 (some of which no longer exist due to construction of the IDF), test pits TP-13 through -22 and test pits TP B and TPC. The older exploration logs are included in Appendix A but; are not discussed in detail except for clarification of specific subsurface conditions.

Phase 1 Area

As discussed in Section 3.1, an initial (i.e., "Phase 1") portion of the SSR-A alternative repository site has been identified within which all existing lime or other -treatment solids on site could be placed. Later expansion of a repository at this site could be implemented to utilize some or all of the full build-out footprint available to accommodate future treatment solids or other on-site by-products if, and as needed based on the results of ongoing studies and selection and characterization of an overall site remedy.

Borings SSR-3, SSR-101 and SSR-102 were completed near the location of the proposed starter dike. The total depths drilled ranged from 100 to 169.2 feet below ground surface (bgs). Boring SSR-101 was completed as a groundwater monitoring well with screened interval set from 27.9 to 37.9 feet bgs. Boring SSR-102 was originally completed to 35 feet, then due to an out-of-plumb surface casing, was offset 5.5 feet south and completed as SSR-102A. Boring SSR-3 was completed through the remnant floor slab of a prior structure.

Borings SSR-101 and SSR-102 encountered 15.4 to 28.5 feet bgs of variable fill consisting of loose to dense sand, gravel and waste rock, with significant silt and clay fraction. Possible buried topsoil was identified in SSR-101 (28.5 to 31.5 feet bgs), and in SSR-102 (15.4 to 16.5 feet bgs).

Below the fill and buried topsoil, layered, extremely dense to medium dense silty gravels, sands and cobble/boulder layers were observed in SSR-101 (to 56 feet bgs), in SSR-102 (to 39 feet bgs) and in SSR-3 to 58 feet bgs). These strata were in turn underlain by dense to medium dense, silty sands (SP, SP-SM and SM) to 110.5 feet bgs (SSR-101), to 81 feet bgs (SSR-102) and were inter-layered with several well-graded gravel beds (GW) to the maximum depth of exploration (100 feet bgs) in SSR-3.

Below 100 feet in SSR-101, an atypical layer of high plasticity clay was observed from 110.5 to 115 feet bgs, underlain by dense sands and silts to 138.5 feet bgs, then by boulder-sized, weathered Hermosa sandstone to 160.5 feet bgs. Very dense clean gravel was present from 160.5 feet bgs to the top of weathered sandstone bedrock (163.4 feet bgs). Hard unfractured rock was noted by rotary wash cuttings (core not recovered) to the maximum depth of exploration (169.2 feet bgs).

Below 81 feet in SSR-102, medium dense to dense, layered gravel, sand and silt was observed, becoming very dense to extremely dense below 122 feet. Altered Hermosa sandstone was then encountered from 136.3 to 142.6 feet bgs, and intact sandstone bedrock was identified from 146.2 feet bgs to the maximum depth of exploration (150.0 feet bgs).

Borings SSR-1 and SSR-2 were completed at the toe and on the upper eastern hillside of the proposed SSR-A Phase 1 area. Gravelly lean clay with sand, silt, cobbles and boulders was observed from existing grade to 22 feet bgs in SSR-1, and from grade to 23 feet bgs in SSR-2. SPT N-values were typically 10 to 40 blows/feet, with a loose zone identified in SSR-2 at 15 feet bgs.

The upper strata in SSR-1 are underlain by inferred alluvial deposits of gravelly lean clay to 42 feet bgs, then by interlayered sands and gravels (clean and silty/clayey), variably medium dense to extremely dense, to the maximum depth of exploration (100 feet bgs). The upper strata in SSR-2 are underlain by alluvial clay with gravel to 35 feet bgs, then by interlayered, very dense to extremely dense, clean to silty sands and gravels, to the maximum depth of exploration (also 100 feet bgs).

Test pit exploration confirmed the presence of some buried debris in the proposed Phase 1 area, including some broken brick and part of a PVC pipe (TP2011-18 and -19), a steel pipe (TP-22), and a buried concrete foundation (TP-19 at 4.4 feet). In general, the shallow soils on the upper eastern hillside (TP2011-17, -18 and -19) appear to consist of fill and/or colluvium, which typically consist of dark brown clayey and sandy gravels / clayey gravels with cobbles and boulders (up to 24-inch size). The surficial soils of the middle

portion of this area consist of clayey sand and gravel fill with some waste rock and calcine lenses based on the logas of earlier TP19 through TP22.

ReMi Line RM-2 identified lower shear wave velocity materials in a range of 1000 to 1300 feet per second within the upper 25 to 30 feet of the ground surface, with higher variability with depth. The highest shear wave velocities were within the northern portion of the array at a depth beginning about 70 feet below grade. The shear wave velocity of this material is lower than expected for intact bedrock, which was confirmed at more than more than 140 feet below grade in SSR-101 and -102. No potentially liquefiable materials were detected in the overburden.

First groundwater is indicated in MW-101 at about 28 feet below surface, El. 8845 ft amsl, and at about 23 feet below surface El. 8839 feet amsl in MW-102. Boring SSR-1 encountered saturated strata at about 44 feet below surface El. 8863 feet amsl, and Boring SSR-2 had saturated strata at about 35 feet below surface El. 8850 feet amsl. These readings correspond to a groundwater elevation ranging from about 8815 to 8819 feet amsl.

Future Build-Out Area

The western portion of the SSR-A repository site (covered at present by the IDF consists of 3-4 feet of solids excavated from Pond 18 in 2011, over a variable thickness of calcines. These fill strata are in turn underlain by native alluvium, as discussed below. Borings SSR-4, SSR-5 and PDF-1 through -3 were completed from 31.5 to 100 feet bgs. Due to the soft nature of the solids, all but PDF-2 were completed through the short dikes that separate the various cells of the IDF. For these particular borings, the nomenclature IDF and PDF (Permanent Drying Facility) refer to the same general area at the St. Louis Ponds.

Borings SSR-4 and -5 encountered 4 feet of IDF dike fill at the surface, followed by loose to medium dense, sand and silt-sized calcines to 25 feet bgs (SSR-4), or by waste rock over sand and gravel fill (4-8 feet), underlain by calcine fill (8 to 25.5 feet) in SSR-5. Below the calcines, medium dense to extremely dense, clean and silty sand and gravel alluvium with cobbles was identified in SSR-4 to the depth of exploration (60 feet bgs). In SSR-5, a layer of extremely dense colluvium or waste rock was located below the calcine fill, followed by clean and silty, sand and gravel alluvium to the maximum depth of exploration (61.5 feet bgs).

Borings PDF-1 through -3 encountered 1.5 to 3.5 feet of waste rock or IDF embankment fill, followed by calcines to 22.5 to 27 feet bgs (an additional layer of clayey gravel fill was located below the embankment from 3.5 to 7.5 feet in PDF-3). Below the calcine fill, borings PDF-1 and -2 encountered clean to silty, sand and gravel alluvium with some cobbles, to the maximum depth of exploration (100 feet bgs in PDF-1 and 31.5 feet bgs in PDF-2). In PDF-3, the calcine fill is underlain by loose to medium dense, organic silty sand alluvium (possible remnant of buried overbank deposits within a river meander) from 23 feet to the maximum depth of exploration (31.5 feet bgs).

Probes CPT-1 through CPT-6 completed in the former Pond 16/17 area (present-day IDF), identified materials interpreted as thinly-layered sandy silts, clayey silts and silty sands to refusal depths of 18 to 29 feet bgs. These are likely the calcines (typically sand- and silt-sized fill materials).

Earlier test pits in the future build-out area (TP2004 F, G, H and I - completed before the IDF was constructed), identified 0.5 to 4 feet of surficial granular fill, over calcine fill to the maximum depth explored (12 feet bgs at that time).

ReMi Line RM-4 at the downstream (west toe) of the future build-out area of SSR-A suggests loose to very loose strata within about 30 feet of the ground surface. The shear wave velocities were as low as about 500 feet per second, which suggests that some of these soils have some potential for liquefaction depending on the characteristics of the design earthquake event for the site still under development. With greater depth,

soil strata were interpreted to be medium dense to very dense. Based on shear wave velocity, denser strata were detected at about 70 to 80 feet bgs within the central to northern portion of the array.

In 2001, first groundwater was indicated in SSR-5 at 15.5 feet below grade, and in PDF-1, -2 and -3 at 14.5, 18 and 14 feet bgs. Based on the surface grades at those locations, the readings correspond to a groundwater El. 8817 to 8821 feet amsl.

2.3.2 Pond 13

Interior

Most of the Pond 13 interior contains recent solids from dredging of Pond 15 (2012) and Ponds 11, 12 and 14 (2013 – in-progress), older solids (approximately 1.5 feet thick from pre-2000) and underlying calcines, all as fill above the native alluvium. Historic aerial photos indicate that portions of this area were used for calcines deposition.

In 2011 and 2012, eight boreholes (P13-101 through -103 and ED-4, -102, -103 and -108), three nested monitoring wells (MW-1S/D, -4S/D and -6S/D), four test pits (TP2011-01, -02, -04 and -08), and one ReMi line (RM-5) were completed within or near the periphery to this repository location as shown on Figure 3. These explorations are discussed herein. Earlier explorations in proximity include Borings DH-3, DH-3R and DH-4 and test pits TP-5 and TP-8. The older exploration logs are included in Appendix A but are not discussed in detail except for clarification of specific foundation conditions.

The 2012 dredging activity required that an intermediate dike (causeway) be built to separate Pond 13 into two cells to settle solids and decant water, respectively, from the dredging operations. Borings P13-101, P13-102 and P13-103 were completed through the new intermediate dike; Borings P13-102 and P13-103 were completed at the perimeter of Pond 13.

Boring P13-101 encountered 3.5 feet of granular causeway fill at the surface, followed by soft oxy-hydroxide lime-treatment solids and then calcine fill to 5 feet bgs. The fill is underlain by saturated, soft or loose organic silts and organic silty sands (likely former river overbank deposits) to 14.1 feet bgs. Below the organic deposits, poorly graded sand, gravel and cobble alluvium with occasional boulders was encountered to 35 feet bgs, followed by medium dense, sand alluvium with modest amounts of fine to medium gravel and minor to negligible amounts of silt (SP-SM and SM) to 80 feet bgs. From 80 feet bgs to the inferred top of weathered bedrock (126.5 feet bgs), further sand alluvium was observed in a dense to extremely dense condition, with increasing gravel below 120 feet bgs.

From 126.5 feet bgs to the maximum depth of exploration (143 feet bgs), Hermosa formation bedrock was encountered. The rock is weathered from 126.5 to 128.6 feet bgs, and is logged as greenish-gray, medium to fine grained and massive. Fractured zones were identified from 137.3 to 138 feet bgs and from 141.8 to 143 feet bgs (with drilling fluid loss).

In Borings P13-102 and P13-103, medium dense sand and gravel fill was encountered to 4.5 to 7 feet bgs, followed by soft silt sediment or oxy-hydroxide solids over calcine fill to 10 to 15.5 feet bgs. Further sand and gravel fill was observed below the calcines in P13-102 to 13.6 feet bgs. Unlike P13-101, the organic river overbank sediments were not observed, as the calcines were underlain by interlayered, mostly medium dense and occasionally loose sand and gravel (mostly SP, SW and GW) to 53 feet in P13-102 and to the maximum depth of exploration in P13-103 (51.5 feet bgs).

In P13-102, deeper alluvium consisted of medium dense, clean and slightly silty sands (SP and SP-SM) to 100 feet bgs, and dense to medium dense, silty and clayey sands to a rubble zone or inferred top of weathered bedrock at 119 feet bgs. An attempt was made to core the rock from 122 to 127 feet bgs (maximum depth of exploration), but no core was recovered (wash cuttings only).

Perimeter Embankments

In 2011, Boring ED-4 was completed in the west or downstream embankment of Pond 13, as one of six borings completed in the flood dike and pond embankments to support evaluations of foundation and slope stability, seepage conditions and piping potential. At that location, the dike fill (grade to 14 feet bgs) was typically granular in nature, consisting of varying percentages of sand, gravel and cobbles, with silt and clay, and medium dense to very dense by SPT test value. A thin layer of calcines was observed at the base of the embankment at 14 feet bgs. Below the embankment fill, the native alluvium consists of medium dense to dense, silty sand and gravel alluvium (14 to 23 feet bgs) over loose, fine to medium sand alluvium to the maximum depth of exploration (31.5 feet bgs).

In 2012, nine borings were completed through the east-west trending embankments of the upper ponds to fill data gaps related to: 1) historical voids or deleterious fill zones noted in prior borings; and 2) to explore deeper, loose sand alluvium below the pond system (for liquefaction and seismic stability evaluations). Relative to Pond 13, Boring ED-102 (north embankment) and ED-103 and -108 (south embankment) were advanced, with no obvious voids detected.

Boring ED-102 encountered variable silty and clayey sand and gravel fill interlayered with waste rock fill, in a dense to loose condition to 18.1 feet bgs, followed by organic silt over partly organic silty clay (possible river overbank material) to 24.5 feet bgs. These materials were in turn underlain by dense to very dense sandy gravel alluvium with cobbles and boulders to the maximum depth explored (31.5 feet bgs).

Borings ED-103 and -108 encountered variably clean or silty/clayey sand and gravel fill to 13 feet (ED-103) and to 12.5 feet bgs (ED-108). The SPT N-values in the fill decrease with depth, in general, from dense/very dense to loose. Below the fill, native sandy gravel alluvium (medium dense to very dense) with variable silt, clay, cobble and boulder content was observed to the maximum depth of exploration (27.5 feet bgs). Boring ED-108 encountered organic silty clay (river overbank material) just below the embankment fill (12.5 to 17.5 feet bgs), followed by interlayered sand and gravel alluvium with variable silt, cobble and boulder content to the maximum depth of exploration (79 feet bgs). The gravelly zones were from 17.5 to 24 feet bgs, 50 to 60 feet bgs and 67 to 79 feet bgs. The upper gravelly alluvium from 17.5 to 24 feet bgs is medium dense to extremely dense; the intermediate sand alluvium is mostly loose to medium dense.

In 2011, test pits 2001-01 and -02 were excavated in the interior of Pond 13 (prior to dredge placement of solids from Pond 15 in 2012). These encountered 1.5 feet of settled solids over about 3.5 feet of calcines fill. Test pits 2011-04 and -08 were completed through the south and north dikes of Pond 13, respectively. These identified mixed sand and gravel embankment fill with varying amounts of silt, clay, waste rock, cobbles and boulders (up to 18-inch diameter) to the maximum depth explored (10.5 feet in TP2011-04), and to 17 feet in TP2011-08. Underlying silty sand alluvium was encountered from 17 feet to the maximum excavated depth (20 feet bgs) in TP2011-08.

ReMi Line RM-5 along the south perimeter embankment of Pond 13 detected relatively uniform results along the extent of the array. Beneath a near surface zone of material having a shear wave velocity in the range of 700 to 800 feet per second, a 10- to 15-foot thick stratum of loose soils was interpreted from the ReMi test. The shear wave velocity in this loose zone was found to range from about 500 to 600 feet per second. This suggests that some of these soils have some potential for liquefaction (again depending on the characteristics of the design earthquake still under development). Beneath the loose stratum, the shear wave velocities were found to gradually increase to about 1500 feet per second. No apparent bedrock was noted within 100 feet of the ground surface.

Monitoring well pairs MW-1S/D, MW-4S/D and MW-6S/D were completed to observe stratigraphy and water levels (shallow within the embankment fill, and deeper in the underlying alluvium) along the perimeter embankments of Pond 13. MW-1S/D (west bank) extended through clayey, sandy and cobbly gravel fill to 10.8 feet bgs, followed by a thin layer of organic silt (buried topsoil or river overbank material) to 11.3 feet

bgs, followed by clayey/silty, sandy gravel alluvium with cobbles to maximum depth (31.5 feet bgs). The deeper well was screened from 15 to 25 feet bgs; the shallow well was screened from 4 to 9 feet bgs. The water levels have varied from 8800 to 8805 feet amsl (rounded) since completion.

MW-4S/D (southeast bank) extended through clayey, sandy and cobbly gravel fill to 10.8 feet bgs, followed by a thin layer of organic silt (buried topsoil or river overbank material) to 19.5 feet bgs, followed by clayey/silty, sandy, gravel alluvium with cobbles to maximum depth (33.5 feet bgs). The deeper well was screened from 21 to 31 feet bgs; the shallow well was screened from 8 to18 feet bgs. The water levels have varied from 8798 to 8800 feet amsl (rounded) since completion.

MW-6S/D (west bank) extended through waste rock fill over clayey, sandy and cobbly gravel fill to 17.5 feet bgs, followed by organic silt alluvium (river overbank material) to 20 feet bgs, followed by clayey/silty, sand alluvium with cobbles to 36.5 feet bgs, followed by clean sand and gravel alluvium to the maximum depth (41.5 feet bgs). The deeper well was screened from 30 to 40 feet bgs; the shallow well was screened from 17-27 feet bgs. The water levels have varied from 8806 to 8809 feet amsl (rounded) since completion.

Borings P13-102 and -103 were also completed as monitoring wells in the lower fill or upper portion of the native alluvium. Those water levels have varied from 8800 to 8801 feet amsl (rounded) since completion.

2.3.3 North Stacked Repository (NSR)

This area contains several features, including a landslide described in more detail in Section 2.1.2. Potential slip planes were identified in the logs, but no positively identifiable landslide failure surface or zone was noted. Also, the eastern part of this area is believed to contain the buried remains of a former acid production facility that was demolished and at least partially buried in-place. Undated photos illustrate demolition and indicate partial burial of large concrete foundations associated with the facility, and the exploration (described below) confirmed the presence of buried debris, including steel “I” beams, cables, concrete and other debris.

In 2011 and 2012, six boreholes (NSR-1 through -4 and ADF/R-1 and -2), six test pits (TP2011-10 and TP2011-12 through -16), three CPT probes (NSR-2, ADF/R-1 and -2), and three ReMi lines (RM-1, RM-6 and RM-101) were completed within or near the periphery to the full build-out area of this alternative repository location as shown on Figure 3. These explorations are discussed herein. Earlier explorations in proximity include monitoring wells GW-1 through GW-3, test pits TP2004-C and –D, and test pits APB-1 through APB-4. The older exploration logs are appended but are not discussed in detail except for clarification of specific foundation conditions.

Eastern Area

Borings NSR-1 and -2 encountered 5.5 to 8 feet bgs of silty gravel fill at the surface, followed by interlayered native clayey silt, silty and sandy clay, silty/clayey and clean gravel, and well to poorly sorted sand (with occasional cobbles and boulders) to the maximum depth of exploration (62 feet bgs in NSR-1 and 100 feet bgs in NSR-2). SPT values indicated the native strata are in general medium dense to extremely dense.

Boring NSR-3 was completed through variable silty and clayey gravel fill to 26 feet bgs, which included cobbles, boulders, demolition debris, metal, mine waste and calcines. Black sludge with a septic odor was noted at 13 feet bgs. Below the fill, interlayered alluvial sands and gravels (extremely dense to medium dense) with thin clay layers were observed to the termination depth of 60 feet bgs.

Boring NSR-4 was completed at the furthest uphill location and extended through possible landslide soil debris from grade to 29.5 feet bgs. These materials consist of silty gravel, clayey silt and silty clay layers, with numerous cobbles and subanglular to angular rock fragments (some up to boulder size). By SPT value, the debris varies from loose to extremely dense, as expected. Below the apparent landslide debris,

silty clay alluvium was encountered to 36 feet bgs, followed by layered, dense to extremely dense, clean to silty/clayey gravel with occasional sand layers, cobbles (rounded to subrounded to 70 feet bgs, then subangular below 80 feet bgs) and boulders. Dolomite bedrock was penetrated by sonic drilling from 90 feet bgs to the bottom of the boring at 100 feet bgs (no rock core recovered).

Test pits 2011-12, -13 and -14 extended to depths of 17 to 20 feet bgs. These pits encountered regraded colluvium and landslide soil debris (gravel, sand, silt and clay with cobbles and boulders). Man-made debris (wood, bricks, steel I-beams and cable) were noted in the fill. In TP2-011-13, the backhoe refused on an unidentified obstacle at 18 feet bgs (likely a buried foundation but not confirmed due to having reached the safe working depth of the excavator).

At the time of drilling, water levels were observed from 21.5 to 34 feet bgs, which corresponds to a water elevation of approximately 8824 to 8842 feet amsl.

ReMi Line RM-6 (completed between NSR-1 and NSR-3) indicates considerable variation in subsurface shear wave velocities. Most of the materials to a depth of 100 feet exhibited shear wave velocities of 1300 feet per second or greater. However, within the southern section of the line, a zone of lower shear wave velocity materials was detected beneath and above denser soils. The lowest shear wave velocity recorded in this anomalous stratum was approximately 600 feet per second. However, this zone is present nearly 80 feet below grade. In general, liquefaction is not thought to occur below a depth of about 75 feet. Apparent bedrock was detected at depths ranging from about 80 to 90 feet bgs.

Western Area

Two sonic borings (Alternate Drying Facility/Repository [ADF/R] Series), two test pits (TP2011-15 and -16) and two CPT probes (in the ADF/R boreholes) were completed in what has been identified herein as the Upper North Staging/Drying Facility (also known as the Alternate Drying Facility/Repository). This area is generally the western part of the NSR (at full build-out) so the exploration results are discussed as part of the NSR. This area is known to have contained a lined pond used as a heap leach facility. Following termination of the leach heap operations, the pond received a small amount of lime treatment solids, believed to have been transferred from Pond 18 in approximately the mid 1990s.

Borings ADF/R-1 and ADF/R-2 encountered 17 to 23.5 feet bgs of variable fill at the surface, followed by extremely dense, silty and sandy gravel alluvium to the maximum depth explored (30 to 31 feet bgs). The fill included a surface layer of silty sand, gravel and clay fill to 4.5 to 9 feet bgs, followed by interlayered sand, gravel, calcines, mine waste ore and wood debris. The aforementioned heap leach liner (synthetic liner material believed to be Hypalon or HDPE) was observed at 3 feet below grade in ADF/R-2.

CPT probes were attempted in the completed ADF/R boreholes, but reached refusal quickly in the coarse alluvium.

Test pit 2011-10 (southwest end of overall area), encountered variable fill over a synthetic liner at 9 feet bgs, in turn underlain by calcines to 14 feet bgs then by alluvium (sand, gravel and boulders infiltrated with calcines) to the maximum depth of 18 feet bgs. Test pits 2011-15 and -16 encountered surface fill over a synthetic liner at 2.5 to 4 feet bgs (covered with a thin layer of pond solids in TP2011-16), followed by clayey, sandy gravel fill with calcine lenses and boulders (up to 36-inch-diameter) to 16 to 20 feet.

The shear wave velocity profile interpreted along ReMi Line RM-1 was found to be relatively uniform, with shear wave velocities typically ranging from about 800 to 1300 feet per second within the upper 25 to 35 feet. Below this, values generally increased to a range of 1500 to 2000 feet per second. No potentially liquefiable materials were detected. No hard rock was interpreted to a depth of 100 feet along this array.

ReMi Line RM-101 was completed in 2012 in the flat area of the proposed Upper North Staging/Drying Facility / NSR. The results indicate approximately 50 to 70 feet of overburden soils in relatively dense condition, with shear wave velocities of about 1,200 to 1,500 feet per second. An indication of the Hermosa Formation bedrock was identified at 80 to more than 100 feet, with shear wave velocities of 2,000 to 2,400 feet per second. This is consistent with the dolomite bedrock identified in NSR-4 at 90 feet bgs.

At the time of exploration, groundwater was observed in ADF/R-1 at 21 feet (approximate El. 8823 feet amsl) and at 7 feet (approximate El. 8836 feet amsl) in ADF/R-2. The latter value may be influenced by perching of groundwater on the buried liner.

Older monitoring wells GW-1, -2 and -3 have recorded groundwater levels in the general elevation range of 8836 to 8843 feet amsl (GW-1), 8824 to 8829 feet amsl (GW-2) and 8822 to 8831 feet amsl (GW-3) since completion (October 2002 through May 2013).

2.4 Laboratory Testing

There was little geotechnical laboratory testing performed on samples from the pre-2011 investigations. Selected soil samples from the 2011-2013 soil borings, monitoring wells and test pits were sent to Western Technologies, Inc. in Durango, Colorado, for index testing (moisture content, grain size, Atterberg Limits and Standard Proctor), in general conformance with the applicable ASTM/AASHTO standards. The results of the laboratory testing completed to date on samples from the field investigations are discussed below and summarized in Table 1. Laboratory data sheets for these tests are available upon request. Note that more detailed results of shear strength testing of embankment fill are presented in Table 2 as discussed in Section 2.4.1 below.

Relatively undisturbed samples of drained solids from the bottom of Ponds 18 and 13 were collected using thin-wall Shelby tube sampling methods, then were sealed and shipped to AECOM's geotechnical laboratory in Vernon Hills, Illinois. The samples were tested for moisture content, specific gravity, unit weight, grain size, triaxial permeability, consolidation, laboratory vane shear and consolidated-undrained triaxial compression, in general conformance with the corresponding ASTM standards. The results of these tests are summarized in Tables 3A through 3F as discussed below. Laboratory data sheets for these tests are also available upon request.

Laboratory testing for 2013 is ongoing, and therefore, the laboratory results presented in this report are a subset of the full testing suite. Results of the ongoing testing will be submitted to EPA as part of the Final Engineering Design and Operations Plan (ED&OP).

2.4.1 Embankment Fill

To evaluate the shear strength of existing dike fill materials (which are also considered as typical of fill from processed, on-site colluvium), direct shear tests were completed on test pit samples recovered from the primary flood dike and pond embankments. Bulk samples of these materials were tested in a large shear box (12 by 12-inch in plan size) at the AECOM laboratory in Vernon Hills, Illinois. Although the shearbox could accommodate a maximum particle size of 1-inch, the minus 3/4-inch fraction was used, as this was the same portion of the overall samples used to complete the Standard Proctor compaction tests performed by Western Technologies. In general, the minus ¾-inch fraction represented 75 to 85 percent of the overall sample gradation.

Individual direct shear samples were compacted to 85 and 95 percent of the associated maximum Standard Proctor dry unit weight, and near the optimum moisture content. These two compaction percentages were chosen to represent modest and high levels of compactive effort, respectively. Two data points were collected at medium and high effective normal stresses (700 and 2,000 pounds per square feet [psf])

compared to the present embankment heights, then a second series of tests was added at low normal stress (150 psf), to evaluate the shape of the failure envelope nearer to the origin.

Based on a two-point regression envelope for shear strength versus normal stress, the effective angle of internal friction (rounded) indicates a range of 37 to 40 degrees at 85 percent relative compaction, and 42 to 47 degrees at 95 percent relative compaction. Using three data points, the typical curvature of the failure envelope near the origin results in a higher effective angle of internal friction (38 to 41 degrees at 85 percent compaction; and 52 to 53 degrees at 95 percent compaction). The variation in effective angle of internal friction due to curvature of the failure envelope may be accounted for in design by taking the slope and intercept near the effective normal stress of interest.

Effective cohesion values reflect the presence of significant silt and clay fraction in the embankment fill. Using a two-point failure envelope, the results are significantly higher for 95 percent vs. 85 percent relative compaction (500 to 800 psf versus 160 to 410 psf). There is less variation for a three-point envelope (80 to 260 psf at 85 percent vs. 130 to 240 psf at 95 percent).

The results of the shear strength testing of representative embankment fill are summarized in Table 2. Given the angular nature of the coarse fraction, the full sample would be expected to have at least as high an effective angle of internal friction. The results presented here are thus conservative, provided that fill sources are reasonably well-graded.

2.4.2 Oxy-hydroxide Solids

Drained lime-treatment solids from the bottom of Pond 18 were excavated by backhoe and placed approximately 2 to 4 feet thick in the four cells of the IDF in early Fall 2011. Cell 1 includes solids placed directly on the exposed calcines subgrade; Cell 2 had an open-graded gravel blanket placed over the exposed calcines subgrade to promote drainage; Cell 3 included a sand filter over the gravel drainage blanket; and Cell 4 was prepared as for Cell 3 except the placed solids were to be tilled from time to time during fair weather months to promote further drainage and evaporative drying. Tillage of the solids in Cell 4 was completed in summer 2013, but subsequent samples have not yet been tested.

Two to three samples were initially randomly collected approximately monthly (during non-winter months) since initial placement from three locations (A, B and C) in each cell, using thin-wall Shelby tube sampling methods augmented by a backhoe to hydraulically push and recover the tubes (due to access limitations for a drill rig). The tubes are sealed, packed and shipped to AECOM's geotechnical laboratory in Vernon Hills, Illinois. Round 1 sampling was completed in late October/November 2011, Rounds 2 through 8 were completed between April and late October 2012, and Round 9 in May 2013. Pertinent results are presented in Tables 3A through 3F and discussed herein.

Specific Gravity and Atterberg Limits

The drained solids have a specific gravity of 3.0, and classify as high-plasticity, inorganic silt (MH) per the Unified Soil Classification System. As summarized in Table 3A, liquid and plastic limits range from 67 to 83 percent and 62 to 79 percent, respectively. These inherent index properties are not expected to change over time, but are presented for comparison to natural soil materials.

Moisture Content and Dry Unit Weight

Per Table 3B, the moisture content of the drained solids ranged from 110 to 340 percent (with one outlier value at 430 percent) soon after placement in October 2011, and decreased in bandwidth to 85 to 220 percent by June 2013 (20 months later) (see Figure B-1 Appendix B). All cells showed significant decrease in moisture content of solids. No cell was clearly superior in terms of moisture content change, indicating that most of the decrease was from evaporative drying versus bottom drainage. It is noted, however, that

these are previously drained solids from Pond 18. Undrained solids are expected to have more significant bottom drainage whereby the base condition of the individual drying cells would have a greater impact.

The dry unit weight of the previously drained solids increased slightly from 2011 to 2012, varying from 13 to 43 pounds per cubic foot (pcf) (all cells) in October 2011, increasing to 21 to 50 pcf by September 2012, and 22 to 49 pcf by June 2013 (See Figure B-2 Appendix B). There are outlier values of 68 to 88 pcf in the October 2012 sampling event, but these may be from upper dessicated layers in certain cells. An ultimate maximum moist unit weight of 50 to 60 pcf for drained solids appears reasonable from review and extrapolation of the drying cell data collected to date. The dry unit weights are summarized together with moisture content in Table 3B.

Undrained Shear Strength

Undrained shear strengths from laboratory vane shear tests were measured starting with Round 2 sampling in April 2012. The measured shear strengths are summarized in Table 3C. There are no significant trends toward increasing peak or residual undrained shear strength for the period measured (April through September 2012) (See Figure B-3 Appendix B). Among the four cells, the peak shear strength has a wider variation (from approximately 110 to 590 psf), while the residual undrained shear strength varies over a narrower range (20 to 90 psf, with one value at 170 psf). From corresponding peak and residual tests of the same specimens, the sensitivity value (peak / residual undrained shear strength) varies from about 3 to 11, with an average of 5, which is relatively high in comparison to natural cohesive soils.

Hydraulic Conductivity

Based on tests as summarized in Table 3D, hydraulic conductivity (by triaxial permeameter) indicates a reduction of about one order of magnitude, from about 1×10^{-6} cm/sec to 1×10^{-7} cm/sec, between Fall 2011 and Fall 2012 (not including one outlier value on the order of 1×10^{-4} cm/sec) (See Figure B-4 Appendix B). Hydraulic conductivity is known to vary by at least one order of magnitude between field and laboratory tests; therefore, the decrease in laboratory-measured hydraulic conductivity is not significant. The range of values is consistent with a silt-sized natural unconsolidated soil (moderately low but finite hydraulic conductivity).

Consolidation/Swell

The results from a total to date of 17 consolidation/swell tests are summarized on Table 3E. The initial void ratio (at setup) from these tests indicate initial void ratios of 5.3 to 10.5 in October 2011, and 5.7 in April 2013. This is due mostly to evaporative drying, with some minor self-weight consolidation in the drying cells. The maximum past pressure averages 1,400 psf (range of 900 to 1,900 psf). Final void ratios are in the range of 2.1 to 6.2. After loading to a maximum of 5,000 psf to simulate stacking of the material in a repository (40 feet of solids at a maximum of 100 psf moist unit weight), the Cc and Cr values for the drained solids range from 0.5 to 5.7 and 0.02 to 0.15, respectively. Both the Cc and Cr values are very high in comparison to typical natural soils, due to the extraordinarily high void ratios of the oxy-hydroxide solids.

Triaxial Shear Strength

The results of 13 multi-stage, consolidated-undrained triaxial shear tests are summarized in Table 3F. These test results indicate an average effective angle of internal friction of 29 degrees (range of 26 to 32 degrees), and an average effective cohesion of 160 psf (range of 50 to 300 psf, with little change from Fall 2011 to Spring 2013. For design of a solids repository, the relatively high effective angle of internal friction in the drained condition (long-term stability) must be tempered with the relatively high sensitivity of the solids in the undrained condition (soon after placement). In other words, the design and operation of the repository must accommodate drainage and reinforcement elements and delivery methods to survive initial placement to allow drained conditions to develop to the fullest extent possible over the long term.

3.0 Alternatives Evaluation

3.1 Repository Contents and Capacity

The materials to be disposed in the repository may include: 1) at least some portion of if not all of the existing lime-treatment solids on site; 2) other mining and/or mineral processing by-products including calcines and waste rock; and 3) future precipitated oxy-hydroxide solids or expended wetland treatment biomass (depending on the primary water treatment remedy selected). Estimates of the potential range of volume of these by-products based on studies to date are summarized as follows:

- Existing oxy-hydroxide precipitated solids (existing lime-treatment solids): 30,000 cy
- Existing pyrite roaster residuals (calcines): 220,000 cy
- Existing SLT tunnel muck (waste rock): 175,000 to 200,000 cy
- Future oxy-hydroxide precipitated solids (future solids): 2300 cy per year (based on an annual average SLT discharge of 1,100 gpm continuously buffered to a pH of 10 standard units in an open-pond lime-addition treatment system); 115,000 cy for assumed 50-year project life
- Future depleted wetlands treatment matrix (wetlands matrix): 7,500 cy per 20-year replacement cycle; 19,000 cy for assumed 50-year project life

For purposes of sizing the repository, it is assumed that either lime addition or wetlands treatment, but not both technologies, will be selected as the primary remedy for the SLT discharge. It is also assumed unlikely that removal and on-site disposal of any significant quantity of waste rock will prove necessary as part of the overall remedy. Studies are ongoing as part of the development of the site conceptual model to assess the need for remedial action to address the calcines, including whether it is necessary to remove some of all of the calcines on site and store them in a repository.

It is further assumed that repository design and construction will be phased in order to meet the anticipated EPA RAWP schedule update requiring that mobilization for repository construction begin during June 2014. Phasing of repository construction has been informally agreed to by EPA, and formal concurrence is anticipated in the near term. The current understanding is that an initial Phase 1 repository is to be designed and constructed that is capable of holding at least the 30,000 cy of existing solids currently on site. Whether the Phase 1 repository is used to hold existing solids, and if so whether only some versus all of those solids would be placed, will be determined based on ongoing work for the site conceptual model and for final selection of the water treatment remedy. The Phase 1 repository will be designed to be able to contain all of the existing solids already on-site, or some portion of the existing solids plus some amount of future solids that may be generated, up to at least a capacity of 30,000 cy. This Phase 1 repository will be able to be expanded to hold a greater volume, and/or another of the alternative repository sites could be developed, as future decisions on the water treatment remedy and/or possible remedies for existing by-products are made.

Based on the assumptions and known conditions, the required ultimate build-out of on-site repository capacity is assumed to be a minimum of 145,000 cy if lime treatment is the selected primary water treatment method and the existing calcines and waste rock are not included. This volume would accommodate all existing solids on site (estimated as 30,000 cy) and the currently estimated future lime treatment solids generated over a 50-year project life (approximately 115,000 cy). Alternatively, the minimum ultimate design capacity to accommodate all existing on-site solids plus the wetlands matrix replacement over a 50-year project life (19,000 cy) would need to be approximately 49,000 cy. The maximum repository capacity

at ultimate build-out is based on the footprint area available for expansion at the candidate repository sites. This potential future capacity available at one or more of the sites would be available for on-site disposal of other by-products (calcines, waste rock, and/or solids from other potential treatment technologies).

3.2 Siting Criteria and Alternative Locations

The alternative locations for a solids repository were chosen based on the following criteria:

- Initial and full build-out footprint relative to capacity;
- Retention of existing relatively level ground in the area north of the active ponds and SLT portal area to the extent feasible for other uses;
- Short-term stability during construction and initial filling assumed with on-site oxy-hydroxide solids, and long-term stability at full build-out;
- Constructability, including potential for phasing expansion to full build-out in multiple steps;
- Maintenance or relocation of the existing United States Forest Service (USFS) road through the site;
- Land ownership and right-of-way issues;
- Proximity to the active ponds system; and
- Favorable interrelationship with other potential elements of the overall site remedy to the extent feasible.

Note that the criterion that a solid waste disposal facility under Colorado SWMMP/HMWMD guidelines not be located over or into an aquifer cannot be met due to the location of the St. Louis Ponds portion of the Rico Tunnels OU-01 of the Rico-Argentine Mine Site overlying and locally constructed into (e.g. Pond 13) the Dolores River overbank alluvial aquifer. However, as discussed later this criterion is mitigated by inclusion of a liner and leachate collection system in the repository design. This approach and mitigation was accepted by Dolores County and CDPHE in the siting and issuance of a CD for the Soil Lead Repository that is now constructed and operating at the Ponds site.

Based on these criteria, the geologic and geotechnical data summarized in Section 2.0, and the potential repository contents and associated volumes summarized above, three potential repository sites are presented; South Stacked Repository–A; North Stacked Repository; and Pond 13 Area. The locations of these three alternatives are illustrated on Figure 3 and discussed below in Sections 3.3 through 3.5.

A fourth site (South Stacked Repository-B) was determined to be infeasible and is no longer being considered. The development of the site would generate excess borrow material well beyond the immediate and foreseeable future needs of the site and would require at least temporary on-site material storage and possibly long-term on-site disposal. The excavation would generate approximately 550,000 cy of excess borrow resulting in a repository capacity of approximately 150,000 cy. Generating this much excess borrow does not efficiently utilize the limited available open space at the site, and managing or disposing the ultimate net excess material competes with potential on-site repository storage of future water treatment residuals and/or existing mining and mineral processing by-products.

A fifth site previously evaluated, the Upper North Area, has also been determined to be not feasible as a repository site. This site would only provide approximately 5,000 cy of capacity for existing or future solids and substantially less ultimate build-out volume for other potential by-product disposal than the other alternative sites. This site is, however, identified as a candidate location for a temporary by-products staging area, or a PDF for future solids should open-pond lime addition be selected as the preferred water treatment remedy.

3.3 South Stacked Repository (SSR-A)

Located at the toe of CHC Hill, this site was selected to be: 1) proximate (immediately east of) the upper ponds where existing solids are present and future solids would be generated if open-pond lime addition or wetlands are the selected water treatment remedy; 2) founded above the seasonal high water table; 3) sited as far from the Dolores River as technically feasible (out of the 100-year floodplain even in the unlikely event of a breach of the flood dike); and 4) to take advantage of a significant source of borrow material that would be generated from the base and back slope cuts, from which the required starter dike would be constructed to achieve the minimum required Phase 1 capacity of at least 30,000 cy.

The disadvantages of using the SSR-A area as a repository site include:

- USFS land is needed and the acquisition is a slow process (although only about 1 acre is needed for phase 1);
- Would need to encroach on existing IDF for capacity greater than Phase I, 30,000 cy; the current IDF is known to be underlain by significant amounts of buried calcines in the former Ponds 16/17 area;
- Must relocate existing haul and construction access road during Phase 1, and existing USFS access road at full build-out, to the west, along ponds 15 and 18; and
- Safety of construction and operation along avalanche chutes (extreme slopes) is a concern and requires added management.

3.3.1 Phase 1 - Alternate A

Depending on the layout of the eastern perimeter of SSR-A, a small but uniquely-situated portion of the repository footprint (0.51 acre) is located on USFS property that would require a land acquisition from the USFS (Figure 4A). An additional approximately 0.5 acre of USFS property would require temporary access during construction. The existing USFS access road can be maintained for this alternative, just beyond the toe of the Phase I starter dike. A branch from the USFS access road currently used to access the SLT area would be covered by Phase I of the repository. This alternative does not encroach onto the IDF, and the calcines underlying the IDF remain accessible during the Phase I build-out. The safety of construction and operation on and below the steep existing and final graded slopes would require thorough planning and implementation of short- and long-term safety measures. The Phase 1 capacity of Alternative A would meet the required 30,000 cubic yards and the total capacity for all additional phases to ultimate build-out (if implemented) would be 337,000 cubic yards.

3.3.2 Phase 1 - Alternate B

This alternative maintains approximately the same footprint as Alternate A, but would not encroach on USFS property (Figure 4B). The modification to the footprint would decrease the surplus borrow material for potential use in other aspects of the overall remedy by approximately 50 percent. The location is also above the seasonal high water table and out of the 100-year floodplain of the Dolores River even in the event of a breach of the flood dike. The USFS access road would, however, require relocation to beyond the toe of the repository starter dike, and the upper branch access road would still be covered by the repository (ie., requiring double handling of material). Relocation of the USFS access road would encroach onto the IDF and approximately 6,000 cubic yards of existing solids would have to be removed, stockpiled temporarily, and ultimately placed into the Phase 1 repository. Relocation of the USFS access road would also encroach onto existing calcines underlying the IDF. If the overall site remedy includes removal of calcines, approximately 25,000 cubic yards would have to be excavated and stockpiled pending final disposition. The Phase 1 capacity of Alternate B would meet the required 30,000 cubic yards; the total capacity for all additional phases to an ultimate build-out (if implemented) would be reduced to 271,000 cy from the 337,000 cy for ultimate buildout of Alternative A.

3.4 Pond 13 Area

In the current hydraulic configuration, Pond 13 is not an inundated pond but is off-line during normal flow conditions. This area was used historically for disposal of relatively modest volumes of calcines and later solids, and recently for at least temporary disposal of solids from Pond 15 in 2012, and from Ponds 11, 12 and 14 scheduled for 2013. The Pond 13 area can be expanded by a perimeter embankment raise to store at least the total of existing solids in the upper ponds (i.e., the 30,000 cy minimum required capacity), with a reserve capacity of approximately 11,000 cy at ultimate build-out.

As benefits, this location makes use of an existing inactive pond that already contains like by-products to some of those that might be disposed, and the location would be protected from the 100-year flood in the Dolores River by the flood dike and a raised perimeter pond embankment.

The disadvantages of using the Pond 13 area as a repository site include:

- Nearly all of the Pond 13 Area is USFS land that would require acquisition for permanent use as a repository;
- The total disposal volume at full build-out is relatively small since the area is surrounded by other ponds and the primary site/USFS access road;
- The existing solids (and possibly calcines) may require removal and temporary on-site storage to allow construction of an appropriate basal liner / leachate collection and solids drainage system;
- No borrow is available from subgrade excavation for use as general fill to construct the embankment raise required on much of the pond perimeter;
- The near-surface water table is likely at or above base elevation of this repository, which can cause uplift on a liner and require either elevating the liner with loss of repository capacity, or another engineered solution to control uplift pressures;
- Liners below the groundwater table are especially problematic if monitoring of leachate flow and quality is required, as minor flaws (e.g., pin hole leaks) can result in inward flow of groundwater; and
- Gravity discharge of effluent is not possible to Ponds 15 and 18, and may not be possible to Ponds 11, 12, or 14; therefore, discharge may require siphoning or pumping.

3.5 North Stacked Repository (NSR)

The NSR is similar in maximum (full build-out) size and proximity to the toe of CHC Hill as SSR-A. This location north of the SLT adit utilizes relatively flat ground northeast of the St. Louis Ponds that is not currently under consideration for other facilities related to any of the potential site remedies under study. It is characterized by the same groundwater and Dolores River set-back advantages as SSR-A and will allow gravity discharge of leachate to the upper ponds (i.e., Pond 18) or to a wetlands treatment system in the Ponds area. The Phase 1 capacity would meet the required 30,000 cubic yards and the total capacity for all additional phases to ultimate build-out (if implemented) would be 311,000 cubic yards.

The disadvantages of using this site for a repository include:

- The position at the toe of CHC Hill overlies a mapped active landslide (part of much larger landslide complex) and would require significant additional geotechnical study, with the potential that mitigation to ensure long-term stability may require extraordinary measures;
- The NSR is traversed by an easement for access to private properties to the north and west on CHC Hill; also access to platted future off-site lots to the north may require the easement to be maintained, which could affect the footprint and/or operation and build-out of the repository;

- Existing foundations from prior large acid plant structures, tanks and ancillary facilities known and/or suspected to have been buried during demolition, may impact construction of the excavation subgrade and liner / leachate collection system;
- Some calcines may have been buried along with acid plant building and foundation remnants; these calcines, if present, may need to be removed and placed within the constructed lined repository; and
- Haul distances from future open-pond lime-treatment of oxy-hydroxide solids would be greater than for the other two candidate repository sites.

3.6 Recommended Repository Alternative

The recommended selection for a solids repository is the South Stacked Repository-A (SSR-A) site. This location is judged the most feasible with regard to: 1) initial and full build-out footprint relative to capacity; 2) retention of existing relatively level ground in the area north of the active ponds and SLT; 3) long-term stability at full build-out; 4) constructability, including potential for phasing in multiple steps; 5) maintenance of the existing USFS road through the site during Phase 1 and feasible minor relocation of a portion of the road during subsequent phases to full buildout; 6) avoidance of interference with the existing Realm Subdivision right-of-way in the north area of the overall St. Louis Ponds area; 7) proximity to the active ponds system and potential wetlands treatment area; 8) favorable interrelationship with most other potential elements of the overall site remedial solution; and 9) ability to accommodate the required Phase 1 volume of 30,000 cy and additional volume of treatment solids or other by-products if/as needed.

As noted in Section 3.1, the current property ownership boundaries, existing site facilities, and existing by-product deposits within the initial (Phase 1) and potential full build-out footprint of SSR-A are somewhat complex, and would require careful sequencing and coordination of activities to meet known near-term and possible long-term disposal needs.

To implement Phase 1 at the SSR-A site in the Alternate A configuration would involve the acquisition of approximately one (1) acre of land from the USFS to cover the actual footprint overlap (about 0.5 acre) and construction access and buffer (estimated at about 0.5 acre). If this land acquisition is not feasible in time to initiate construction of Phase 1 in June, 2014, then the Phase 1 SSR-A footprint would have to be reconfigured and in part moved to the west (i.e., Alternate B).

Re-location of the Phase 1 SSR-A to construct the Alternative B footprint to the west would, however, encroach upon a portion of the existing IDF constructed in 2011, and would require temporary removal and stockpiling of the affected solids currently in the IDF (likely using the Upper North Area described previously) until the Phase 1 repository was ready to receive these solids for permanent disposal. In addition, any actions required to address the existing calcines underlying and adjacent to the affected area in the former Ponds 16/17 would have to be implemented prior to Phase 1 repository construction. If removal of the affected calcines beneath a revised Phase 1 SSR-A footprint proved necessary, it is assumed that the calcines would either be placed back in the original location following treatment or installation of a liner, or be stored in the Upper North Area until their final disposition was determined. Although not ideal, these measures are technically feasible and could be accomplished as part of the Phase 1 repository construction in time to meet the RAWP revised schedule deadline of October 31, 2014 for initiating disposal in the repository (assuming any required remedial actions for the calcines are known by fall 2013).

4.0 Preliminary Design

This Section 4.0 presents a basis for preliminary design of the recommended SSR-A repository. Both Alternates A and B are included, since negotiation of acquisition of the related USFS tract of land is still in progress and may not be able to be consummated by Summer 2014.

As previously discussed, existing oxy-hydroxide pond solids, calcines, and waste rock; future solids or depleted wetland treatment biomass (depending on the primary water treatment remedy selected); are currently candidate materials to be disposed of in the repository. The initial build-out capacity requires a minimum volume of 30,000 cubic yards to be below the crest of a starter dike that would completely contain all on-site oxy-hydroxide solids without requiring stacking. The full build-out will require a minimum of 49,000-145,000 cy of additional air space, depending on the selected primary water treatment technology.

4.1 Capacity / Phased Build-Out

SSR-A Alternates A and B (Figures 5 through 8) have Phase 1 capacities of 32,000 and 31,000 cy respectively, slightly exceeding the required storage criterion. At full build-out, Alternates A and B have maximum capacities of 337,000 and 271,000 cy, respectively, assuming stacking of materials on a currently envisioned maximum side slope of 3H:1V (Figures 4A and 4B).

After placement of existing solids in the Phase 1 cell, future phasing of the overall repository footprint will depend on the chosen mine water treatment technology (and/or if other existing mining or mineral processing by-products need to be disposed in the repository). If lime amendment or wetlands treatment are chosen, the volumes of future solids and/or depleted wetlands matrix will be generated at an estimated but as-yet not confirmed rate. If existing calcines or waste rock are required to be excavated and placed, those are immediately available as repository air-space allows. In either case, it is expected that an interim soil cover will be required to be placed over the waste materials at the end of any construction season to mitigate wind erosion and dispersal of the fines fraction of solids, depleted matrix or existing by-products.

4.2 Depth to Groundwater

Per Table 4, the maximum recorded groundwater elevation at monitoring wells MW-101 (8818.6 feet amsl), MW-102 (8817.9 feet amsl) and GW-7 (8825.1 feet amsl) are all several feet or more below the planned base elevation of the Phase 1 cell of SSR-A (8830 feet amsl). Considering the planned liner and leachate collection systems to be provided at the base of the repository, the lowest elevation of the SSR-A repository is considered to be sufficiently above the groundwater table to avoid interference with these systems. Regardless, long-term ambient groundwater monitoring is planned as part of the final design.

4.3 Bearing Capacity and Settlement

4.3.1 Bearing Capacity

The repository subgrade support condition can be treated as the equivalent of a mat foundation. For the granular soils typical of the foundation colluvium in the Phase I area, the maximum net allowable bearing pressure (in kips per square foot [ksf]) for a foundation settlement of 1 inch or less, is given by N/4, where N is the blow count from the SPT N-value. The general base elevation of the Phase 1 cell after mass excavation is assumed at El 8830. From Borings SSR-1, -2, -3, -101 and -102, the existing N-values within 50 feet below El. 8830 feet amsl varies from about 10 to more than 100 blows/feet. Therefore, the maximum net allowable bearing pressure (without foundation improvement) is 2.5 ksf (2,500 psf). This is approximately equal to the expected maximum applied pressure from 40 feet of stacked solids in the moist

condition (40 feet x 60 pcf or 2,400 psf). As the soil borings represent a sampling of what will be the bottom condition of the excavated Phase 1 cell, and given that certain borings (SSR-101 and -102) indicate fill materials below El 8830, the final design will incorporate recompaction of the base of the excavation prior to placing cushion and liner materials. Provision will also be included in the specifications for local removal, replacement and compaction of unsuitable subgrade material if determined necessary during construction.

The planned 20-foot-high Phase 1 starter dike will have an estimated bottom El. 8840 feet amsl. The results from borings SSR-3, -101 and -1-2 indicate average N-values of 10 to more than 100 blows/feet in the colluvium/alluvium within the upper 40 feet below that elevation, indicating a maximum net allowable bearing pressure of 2.5 ksf (2500 psf). This is approximately equal to the maximum initial applied pressure of 125 pcf x 20 feet, or 2,500 psf. As noted above for the main portion of the repository footprint, the presence of fill materials and some lower N-value materials below El. 8840 feet amsl indicate that local ground improvement of the excavated subgrade will be required in the footprint of the starter dike. This may involve compaction of the subgrade or removal of unsuitable material, replacement with structural fill, and compaction of the placed fill.

4.3.2 Settlement

As noted above, the maximum allowable bearing pressures for the granular colluvium/alluvium correspond to 1 inch or less of total foundation settlement, and would be proportionally less for lower maximum applied pressures or compacted foundation materials. The foundation settlement is expected to occur during construction in the case of the starter dike, and relatively soon after each primary lift of solids is placed in the cells over time. Self-weight settlement of the solids or other waste materials is considered elsewhere.

4.4 Slope Stability

4.4.1 Starter Dike

The side slopes of the starter dike are proposed at 2H:1V, with a crest width of 20 feet. The dike will be constructed of site-excavated colluvium/alluvium, processed to remove stones larger than 4 inches. The material will then be placed as an engineered fill, with appropriate moisture and compaction control. Based on the results of large direct shear tests presented in Section 2.4, an effective angle of internal friction and effective cohesion of 38 degrees and 100 psf, respectively, are considered reasonable. The resulting Factor of Safety (FS) of the starter dike and its foundation is greater than 1.5 which is acceptable for long-term loading (see stability analysis results in Appendix C). Seismic effects are considered minimal at this location given the nature of the subgrade and dike materials and the height and geometry of the dike, and are thus not considered further.

4.4.2 Stacked Solids

Depending on the phasing of the repository, at full build-out, the solids from a full-scale lime treatment system may be stacked on the order of 40 feet above the base of the cell. Based on the laboratory data of solids placed in the IDF (Section 2.4), the effective angle of internal friction and effective cohesion of drained solids is estimated at 29 degrees and 100 psf, respectively. However, the solids exhibit a very high void ratio, even after 1-D consolidation to 5,000 psf, and also show low undrained shear strength and relatively high sensitivity. Therefore, undrained strength is expected to control the slope stability behavior of the solids, at least until well into the future when long-term consolidation, cementation and aging effects may improve the undrained strengths.

Preliminary slope stability analysis of drained solids placed at an assumed 3H:1V grade, using average peak and residual strength values of 400 and 50 psf from the vane shear tests, indicate factors of safety below 1.0 (see stability analysis results in Appendix C). It is assumed that solids stacked above the crest of the starter dike will require reinforcement in the form of geogrid, as indicated in the preliminary slope stability analysis of (see results in Appendix C).

4.5 Leachate Control

A geosynthetic liner with supporting soil cushion sand layer will be placed on the graded base of the repository. The liner properties will be chosen to manage friction and sliding of the overlying soil and waste materials along with ease of installation (seaming requirements), and service life in the local climate.

4.5.1 Cell Drainage

During initial grading, the base of the Phase 1 repository will be graded to drain generally from east to west towards the west side of the starter dike. A leachate drainage/collection system, mirroring the slope of the cell bottom and liner, will be provided at the base of the repository, on top of the liner. If required for abrasion resistance, an underlying sand cushion will be placed under the drainage layer (directly against the top of the liner). The gradations of dissimilar drainage and cushion/filter layers will be chosen to meet applicable filter and permeability criteria. This system, in the form of graded gravel with collection piping (with cushion sand layer immediately on top of the liner if required), will collect gravity/consolidation drainage from the solids, and route that drainage to one of two manholes for conveyance to the treatment system.

4.5.2 Conveyance

Leachate from gravity drainage from the placed solids and other waste materials will drain by gravity to the drainage layer then to one of two manholes that will be raised as the cell is constructed. The outflow from these manholes will be conveyed by underground gravity pipeline to either Pond 15 or 18 (if lime treatment is chosen) or to a designated location within the wetlands system (for a wetlands treatment alternative). The cell bottom elevation of 8830 feet was chosen to allow a minimum pipe grade of $1/8^{th}$ inch-per-foot (about 1%) from the bottom of the repository Phase 1 cell to discharge above the historical normal water elevation of the uppermost existing pond in the system (Pond 18 at 8823 feet amsl).

4.6 Run-on/Run-off and Infiltration

To minimize treatment of otherwise clean stormwater (rain and snowmelt), each phase of the repository will be graded at its perimeter and internally to eliminate run-on from outside the footprint of the repository, and encourage rapid runoff of direct precipitation (rain or snowmelt) on the repository surface to reduce potential infiltration of materials placed in the repository.

Infiltration of precipitation (and wind-induced erosion) will be reduced by placement of clean, intermediate and final soil cover, as governed by the sequencing of waste placement in the repository.

4.7 Drying Facility

It is intended to continue to utilize the existing IDF during initial operation of the Phase 1 repository, assuming that such use is compatible with other facilities and operations of the overall site remedy. If necessary, the subgrade of the existing IDF could be modified to incorporate a liner and leachate collection system similar in concept and operation to that underlying the Phase 1 repository. This system would be constructed after the existing solids in the IDF were placed in the Phase 1 repository. Note that if Alternate B is selected for the Phase 1 SSR-A repository that a portion of the existing IDF (currently estimated as about 40 percent) will be unavailable for use during the time the lower branch of the existing Forest Service access road is being relocated. The adequacy of the existing IDF footprint (or the available portion thereof under Alternate B) will be further assessed as decisions are made as to the materials, volumes and timing of disposal planned for the Phase 1 repository.

If lime-treatment is selected as the mine water treatment remedy at the site, then a PDF would be sited, designed and constructed. Under this scenario, it appears at this time that a PDF would be located in the Upper North Area as described previously in Section 3.2. This would maintain the maximum expansion

potential of the SSR-A repository and utilize a portion of the site not yet identified for an alternative long-term remedial action or facility. This would likely require utilizing the NSR repository site for staging construction materials and supplies that are currently present within the Upper North Area. The Upper North Area could also be used if the existing IDF proves not feasible or adequate during the life of the Phase 1 repository due to material type, volume and/or timing / sequencing issues.

If instead wetlands treatment (or another low volume treatment residuals process) is selected (and no existing calcines or waste rock need to be relocated to the repository), then it may be feasible to utilize a portion of the ultimate build-out footprint of SSR-A as a staging and drying area to the extent necessary. Alternatively, the Upper North Area could be used for these purposes.

5.0 Permitting Process and Schedule

The process to acquire a Certificate of Designation (CD) is discussed in this Section 5.0. The estimated project schedule is shown on Figure 9. The project schedule outlines the timeline for completion of the permitting process, design documentation for submittal to EPA, solids repository construction and initial solids placement into the repository.

5.1 Certificate of Designation

AR intends to obtain a CD for the solids repository through a Dolores County Land Use Application (DLUA). Construction activities for the permanent repository will commence following issuance of the CD by Dolores County. AR understands that EPA is not requiring that a permit be obtained as consistent with Comprehensive Environmental Response Compensation and Liability Act (CERCLA) response actions. However, the schedule associated with the design and permitting process is intended to accommodate the permit review and decision process for the repository to be completed before it is necessary to place pond-related solids.

A DLUA will be prepared for submittal to Dolores County and will include an ED&OP which will include details for construction of the repository subgrade, liner/leachate collection system, and placement of the existing precipitation solids removed from the upper ponds (some of which are temporarily staged in the IDF and Pond 13). The ED&OP will also address post-removal action of possible new treatment solids in the PDF and then into the solids repository following adequate dewatering ("drying") and consolidation. The ED&OP accompanying the DLUA will describe potential alternative placement methods, slope configurations, and stabilizing elements (e.g., external slope buttress; internal tensile reinforcement; etc.) that may be implemented if open-pond lime-treatment is the selected remedy at the site. Final design of the stacked portion of a repository to contain substantial amounts of future lime treatment oxy-hydroxide solids must await the testing and evaluation of dewatered and consolidated treatment solids during the first several years of full-scale operation of a ponds treatment system and PDF (or alternate lime-treatment facility such as a high-density sludge plant).

The following provides a general sequence of the DLUA and ED&OP development and review process leading up to the issuance of the CD:

- Preparation of DLUA and applicable accompanying documents
  - Prepare and submit DLUA/CD application package; Documents required: Dolores County Application for Land Development, Project Overview, County Performance Standards Compliance Review, State Statute Review Standards Identification, Solid Waste Disposal Sites and Facilities Application Checklist, ED&OP, Financial Assurance, Application Fee
  - Preparation of ED&OP; The ED&OP documents the design and operation of the treatment solids repository and must accompany the DLUA/CD application
  - Submittal of DLUA and accompanying documents to Dolores County
  - Dolores County Review and submittal of ED&OP to CDPHE
  - CDPHE review for application completeness. This review will be led by CDPHE with input from Dolores County and will assess the completeness of the information submitted, not technical issues or financial assurance.

  - CDPHE comprehensive technical review and public hearing/comments. This review will be performed primarily by CDPHE and focus on the ED&OP.
  - CDPHE recommendation to Dolores County. This is the formal recommendation by CDPHE to the County on acceptability of the DLUA/CD application, including technical matters and financial assurance.
- Dolores County issuance of CD.

5.2 Design Documentation

The design of the treatment solids repository will be documented in the ED&OP prepared to support the DLUA/CD application. This document will also serve as the final design document submittal to EPA for its approval of the solids repository.

5.3 Solids Repository Construction and Initial Solids Placement

Construction will proceed in the sequence and utilizing approved means and methods as identified in the ED&OP which will include construction drawings and technical specifications. The work will include the following primary construction activities: 1) construction of the subgrade improvements, run-on controls, liner system, and initial starter dike (i.e., berm/buttress), constituting the Phase 1 solids repository as described in Section 4.0; 2) reconfiguration and re-construction of the IDF (if lime-treatment is the selected final remedy for water treatment); and 3) placement of solids from the IDF, Pond 13, and possibly the remaining approximately 2 feet of solids remaining in the upper ponds into the prepared repository.

The activities of the selected construction contractor will be overseen by AR on a full-time, on-site basis. Depending on actual conditions encountered during the course of the work, appropriate adjustments in the means and methods of construction and/or initial placement of solids may be identified. Any such adjustments will be presented to the approving agencies for timely review and approval, and upon approval, implemented by the construction contractor.

In addition to observing the quality of the work, AR and its contractor will also track and record the depth and volume of solids removed from the interim drying facility, Pond 13 and if applicable the upper ponds, and the location and time of placement in the solids repository. Periodic surveys will be made of the solids deposited in the repository to document the amount and rate of ongoing consolidation.

6.0 References

AR, 2011. *Initial Solids Removal Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado*; submitted by Atlantic Richfield Company to EPA May 2, 2011.

AR, 2012. *Pond 15 Solids Removal Work Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado*; submitted by Atlantic Richfield Company to EPA, August 3, 2012.

AR, 2013. *2013 Solids Removal Work Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico, Colorado*; submitted by Atlantic Richfield Company to EPA May 13, 2013.

McKnight, Edwin T., 1974, Geology and Ore Deposits of the Rico District, Colorado, U.S. Geological Survey Professional Paper 723, 100 pp, 3 plates.

USBR, 2001. U.S. Department of the Interior, Bureau of Reclamation. 1998. Engineering Geology Field Manual, Second Edition, Volume I (1998, reprinted 2001) and Volume II (2001).

USEPA, 2011a. Unilateral Administrative Order for Removal Action (UAO), U.S. EPA Region 8, CERCLA Docket No. CERCLA-08 20011-0005, March 23.

USEPA, 2011b. *Removal Action Work Plan, Rico-Argentine Mine Site – Rico Tunnels Operable Unit OU01, Rico*, Colorado dated March 9, 2011.

Tables

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
ADF/R-1	0-5	BULK	-	-	47	34	19	-	-	129.6	9.5	-	-	GM
ADF/R-1	10	SS	16.2	-	-	-	-	-	-	-	-	-	-	SW
ADF/R-1	13	SS	49.4	-	-	-	-	-	-	-	-	-	-	SW
ADF/R-1	17	SS	46.4	-	-	-	-	NP	NP	-	-	-	-	SM
ADF/R-1	22	SS	11.7	-	-	-	-	-	-	-	-	-	-	SM
ADF/R-2	2	SS	13.8	-	-	-	-	-	-	-	-	-	-	SM
ADF/R-2	6	SS	10.9	-	-	-	-	-	-	-	-	-	-	SM
ADF/R-2	12	SS	9	-	73	20	7	-	-	-	-	-	-	GM-GP*
B-2	9.5	-	-	-	37	41	22	-	-	-	-	-	-	-
B-4	9.5	-	-	-	41	37	22	-	-	-	-	-	-	-
ED-1	1	SS	7.8	-	44	33	23	-	-	-	-	-	-	GC
ED-1	4	SS	10.4	-	-	-	-	-	-	-	-	-	-	OL
ED-1	7.5	SS	-	-	-	-	-	-	-	-	-	-	-	GW-GM
ED-1	12	SS	13.6	-	-	-	-	NP	NP	-	-	-	-	SC
ED-1	20	SS	11.3	-	-	-	-	NP	NP	-	-	-	-	SM
ED-1	26	SS	22.8	-	-	-	-	-	-	-	-	-	-	SM
ED-1	31	SS	22	-	-	-	-	-	-	-	-	-	-	SM
ED-1	36	SS	25.3	-	-	-	-	NP	NP	-	-	-	-	SM
ED-1	41	SS	24.4	-	-	-	-	-	-	-	-	-	-	SM
ED-1	46	SS	22.1	-	-	-	-	-	-	-	-	-	-	SM
ED-1	51	SS	24.3	-	-	-	-	-	-	-	-	-	-	SM
ED-1	56	SS	23.8	-	-	-	-	-	-	-	-	-	-	SM
ED-1	61	SS	24	-	-	-	-	NP	NP	-	-	-	-	SM
ED-1	71	SS	not run	-	-	-	-	NP	NP	-	-	-	-	SM
ED-1	76	SS	26.9	-	-	-	-	-	-	-	-	-	-	SM
ED-1	91	SS	-	-	-	-	-	NP	NP	-	-	-	-	CL
ED-102	1-2.5	SS	12.1	-	-	-	-	-	-	-	-	-	-	-
ED-102	3-4.5	SS	11.3	-	-	-	-	-	-	-	-	-	-	-
ED-102	5-6.5	SS	14.7	-	-	-	-	-	-	-	-	-	-	-
ED-102	7.5-9	SS	20.7	-	57	31.5	11.5	-	-	-	-	-	-	-
ED-102	10-11.5	SS	29.3	-	2	46.9	51.1	-	-	-	-	-	-	-

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
ED-102	12.5-14	SS	28.9	-	15	51.9	33.1	-	-	-	-	-	-	-
ED-102	15-16.5	SS	10.9	-	-	-	-	-	-	-	-	-	-	-
ED-102	17.5-19	SS	26.9	-	-	-	-	-	-	-	-	-	-	-
ED-102	22.5-24	SS	25.4	-	-	-	-	-	-	-	-	-	-	-
ED-102	25-26.5	SS	10	-	-	-	-	-	-	-	-	-	-	-
ED-102	30-31.5	SS	12.9	-	-	-	-	-	-	-	-	-	-	-
ED-103	1-3	SS	11.5	-	35	40.7	24.3	-	-	-	-	-	-	-
ED-103	5.6-7.6	SS	4.2	-	-	-	-	-	-	-	-	-	-	-
ED-103	8-10	SS	7.1	-	75	18.8	6.2	-	-	-	-	-	-	-
ED-103	10.5-12.5	SS	6.9	-	-	-	-	-	-	-	-	-	-	-
ED-103	13-15	SS	13.9	-	48	29.5	22.5	-	-	-	-	-	-	-
ED-103	15.5-17.5	SS	13.5	-	-	-	-	-	-	-	-	-	-	-
ED-103	18-20	SS	12.3	-	-	-	-	-	-	-	-	-	-	-
ED-103	20.5-22.5	SS	9.8	-	68	26.2	5.8	-	-	-	-	-	-	-
ED-103	25.5-27.5	SS	11.7	-	-	-	-	-	-	-	-	-	-	-
ED-108	0-2.5	SS	5.8	-	-	-	-	-	-	-	-	-	-	-
ED-108	2.5-3.5	SS	12.3	-	28	43.5	28.5	-	-	-	-	-	-	-
ED-108	5-6.5	SS	11.7	-	-	-	-	-	-	-	-	-	-	-
ED-108	7.5-9	SS	12.5	-	-	-	18.7	-	-	-	-	-	-	-
ED-108	10-11.5	SS	18.1	-	-	-	-	-	-	-	-	-	-	-
ED-108	12.5-14	SS	40.1	-	-	-	-	-	-	-	-	-	-	-
ED-108	15-16.5	SS	39.3	-	-	-	-	-	-	-	-	-	-	-
ED-108	17.5-19	SS	11.4	-	57	34.8	8.2	-	-	-	-	-	-	-
ED-108	20-21.5	SS	12.9	-	-	-	-	-	-	-	-	-	-	-
ED-108	22.5-23	SS	8.7	-	-	-	-	-	-	-	-	-	-	-
ED-108	25-26.5	SS	23.2	-	2	89.4	8.6	-	-	-	-	-	-	-
ED-108	30-31.5	SS	27.3	-	-	-	-	-	-	-	-	-	-	-
ED-108	32.5-34	SS	25.8	-	-	-	-	-	-	-	-	-	-	-
ED-108	35-36.5	SS	25.3	-	-	-	28	-	-	-	-	-	-	-
ED-108	37.5-39	SS	29.6	-	-	-	-	-	-	-	-	-	-	-
ED-108	40-41.5	SS	29.2	-	-	-	29.2	-	-	-	-	-	-	-

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
ED-108	42.5-44	SS	30.9	-	-	-	-	-	-	-	-	-	-	-
ED-108	45-46.5	SS	29.3	-	-	-	-	-	-	-	-	-	-	-
ED-108	47.5-49	SS	26.2	-	-	-	93.7	-	-	-	-	-	-	-
ED-108	50-51.5	SS	13.4	-	53	35.6	11.4	-	-	-	-	-	-	-
ED-108	52.4-54	SS	12.7	-	-	-	-	-	-	-	-	-	-	-
ED-108	57.5-59	SS	14.2	-	-	-	-	-	-	-	-	-	-	-
ED-108	62.5-64	SS	27.1	-	-	-	64.9	-	-	-	-	-	-	-
ED-108	67.5-69	SS	13.6	-	-	-	6.6	-	-	-	-	-	-	-
ED-108	72.5-74	SS	3.3	-	-	-	-	-	-	-	-	-	-	-
ED-108	77.5-79	SS	14.1	-	-	-	-	-	-	-	-	-	-	-
ED-108A	12.5-14.5	-	-	-	-	-	-	42	12	-	-	-	-	-
ED-108A	14.5-16.5	-	-	-	-	-	-	34	11	-	-	-	-	-
ED-2	1	SS	4.6	-	-	-	-	23	NP	-	-	-	-	GW
ED-2	0-4	BULK	-	-	54	25	21	-	-	138.5	7	-	-	GM*
ED-2	4-5	BULK	-	-	-	-	-	-	-	-	-	-	-	GW & SM-GM w/ org
ED-2	6	SS	12.9	-	58	27	15	23	NP	-	-	-	-	GM*
ED-2	11	SS	17	-	-	-	-	-	-	-	-	-	-	GM-GP
ED-2	7.5-12	BULK	-	-	-	-	-	-	-	-	-	-	-	GM-GP
ED-2	16	SS	15.6	-	-	-	-	-	-	-	-	-	-	GM-GP
ED-2	21	SS	19.1	-	12	36	52	NP	NP	-	-	-	-	SM & ML*
ED-4	1	SS	6.4	-	-	-	-	24	6	-	-	-	-	GC-GM
ED-4	0-5	BULK	-	-	35	37	28	-	-	131.4	9.7	-	-	SM*
ED-4	6	SS	9.7	-	-	-	-	-	-	-	-	-	-	GC-GM
ED-4	11	SS	11	-	-	-	-	-	-	-	-	-	-	GW
ED-4	16	SS	11	-	-	-	-	24	7	-	-	-	-	GC
ED-4	21	SS	12.9	-	-	-	-	-	-	-	-	-	-	GC
ED-4	26	SS	23.5	-	-	-	-	-	-	-	-	-	-	SM
MW-1D	1	SS	9.8	-	-	-	-	23	3	-	-	-	-	GC
MW-1D	0-5	BULK	-	-	48	34	18	-	-	134	7.2	-	-	GC
MW-1D	6	SS	17.4	-	-	-	-	-	-	-	-	-	-	GC
MW-1D	13	SS	19.5	-	-	-	-	22	5	-	-	-	-	GM-GC

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
MW-1D	12.5-18.5	BULK	-	-	54	33	13	-	-	-	-	-	-	GM-GC
MW-1D	21	SS	9.7	-	-	-	-	-	-	-	-	-	-	GM-GC
MW-1D	26	SS	7.8	-	-	-	-	-	-	-	-	-	-	GM-GC
MW-202	0-1.5	SONIC	19	-	57	30	13	NV	NP	-	-	-	-	-
MW-202	1.5-6	SONIC	20	-	35	40	25	30	21	128	9	-	2.65	-
MW-202	6-9	SONIC	14.1	-	-	-	-	-	-	-	-	-	-	-
MW-202	9-12	SONIC	18.2	-	-	-	-	-	-	-	-	-	-	-
MW-202	12-18	SONIC	24	-	20	70.7	9.3	30	21	125.1	10.4	-	2.65	-
MW-202	18-23	SONIC	13.1	-	20	70.7	9.3	30	21	125.1	10.4	-	2.65	-
MW-202	23-30	SONIC	36	-	20	70.7	9.3	30	21	125.1	10.4	-	2.65	-
MW-202	30-35.5	SONIC	9.7	-	-	-	-	-	-	-	-	-	-	-
MW-4D	1	SS	10.2	-	-	-	-	24	5	-	-	-	-	GC
MW-4D	0-5	BULK	-	-	-	-	-	-	-	-	-	-	-	GC & GW-GC
MW-4D	6	SS	8	-	-	-	-	-	-	-	-	-	-	GW-GC
MW-4D	11	SS	15.2	-	-	-	-	-	-	-	-	-	-	GW-GC
MW-4D	16	SS	10.7	-	-	-	-	28	7	-	-	-	-	GC
MW-4D	21	SS	19.8	-	-	-	-	-	-	-	-	-	-	GM-GC
MW-4D	20-25	BULK	-	-	-	-	-	-	-	-	-	-	-	GM-GC & GW
MW-4D	28	SS	23.2	-	-	-	-	-	-	-	-	-	-	GW
MW-5D	7	SS	28.2	-	-	-	-	-	-	-	-	-	-	SP
MW-5D	6-15	BULK	-	-	0	64	36	-	-	104.8	28.5	-	4.48	SC*
MW-5D	17	SS	60	-	-	-	-	NP	NP	-	-	-	-	SP-SM
MW-5D	15-20	BULK	-	-	0	30	70	-	-	95.7	35.1	-	4.59	ML*
MW-5D	22	SS	-	-	-	-	-	-	-	-	-	-	-	Org. ML-OL
MW-5D	26	SS	18.7	-	-	-	-	-	-	-	-	-	-	GW-GM
MW-5D	25-30	BULK	-	-	70	20	10	-	-	-	-	-	-	GW-GM*
MW-5D	31	SS	41	-	-	-	-	-	-	-	-	-	-	GW-GM
MW-5D	30-35	BULK	-	-	72	21	7	-	-	-	-	-	-	GW-GM
MW-6D	1	SS	7.8	-	-	-	-	-	-	-	-	-	-	GW-GM
MW-6D	0-3.5	BULK	-	-	55	28	17	-	-	136.1	8.2	-	-	GW-GM
MW-6D	5	SS	9.8	-	-	-	-	26	6	-	-	-	-	GC

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
MW-6D	3.5-7.5	BULK	-	-	47	34	19	-	-	127	12.1	-	-	GC
MW-6D	10	SS	9.1	-	-	-	-	-	-	-	-	-	-	GC
MW-6D	14	SS	6	-	-	-	-	-	-	-	-	-	-	GW-GM
MW-6D	18	SS	26.4	-	-	-	-	42	14	-	-	-	-	ML-OL
MW-6D	17.5-20	BULK	-	-	19	29	52	-	-	-	-	-	-	ML-OL
MW-6D	25	SS	18.4	-	-	-	-	22	4	-	-	-	-	SC
MW-6D	33	SS	24.1	-	-	-	-	-	-	-	-	-	-	GW
MW-6D	31.5-36.5	BULK	-	-	48	30	22	-	-	-	-	-	-	GM*
NSR-1	7	SS	15.4	-	22	44	34	-	-	-	-	-	-	SM*
NSR-1	13	SS	14.7	-	-	-	-	26	8	-	-	-	-	CL
NSR-1	17	SS	14.7	-	-	-	-	-	-	-	-	-	-	CL
NSR-1	26	SS	15.2	-	-	-	-	-	-	-	-	-	-	GM
NSR-1	31	SS	12.5	-	-	-	-	-	-	-	-	-	-	GC
NSR-1	34	SS	-	-	57	29	14	-	-	-	-	-	-	GM
NSR-1	43	SS	10	-	-	-	-	22	3	-	-	-	-	GC
NSR-2	0-5	BULK	-	-	39	41	20	-	-	136.6	6.4	-	-	SM*
NSR-2	7-10	BULK	-	-	-	-	-	28	NP	-	-	-	-	CL
NSR-2	10-12.5	BULK	23.7	-	-	-	-	-	-	-	-	-	-	GM
NSR-2	15-20	BULK	-	-	64	25	11	-	-	-	-	-	-	GW-GC*
NSR-2	30-35	BULK	15.8	-	-	-	-	23	7	-	-	-	-	GM
NSR-2	35-40	BULK	17	-	-	-	-	-	-	-	-	-	-	SP
NSR-2	55-56	BULK	28.6	-	-	-	-	-	-	-	-	-	-	SP
NSR-2	60-62	BULK	27.4	-	-	-	-	-	-	-	-	-	-	GM
NSR-2	67-70	BULK	26.3	-	-	-	-	-	-	-	-	-	-	SP
NSR-2	70-72	BULK	13	-	-	-	-	-	-	-	-	-	-	SP
NSR-2	78-80	BULK	21.8	-	-	-	-	-	-	-	-	-	-	SP
NSR-3	0-5	BULK	-	-	53	27	20	-	-	133.1	8.6	-	-	GP-GM*
NSR-3	5-10	BULK	14.8	-	-	-	-	32	12	-	-	-	-	GC
NSR-3	13-15	BULK	12.8	-	-	-	-	-	-	-	-	-	-	GC
NSR-3	15-18	BULK	9.3	-	-	-	-	-	-	-	-	-	-	GC
NSR-3	23-25	BULK	14.4	-	-	-	-	-	-	-	-	-	-	GC

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
NSR-3	34-37	BULK	18.9	-	-	-	-	-	-	-	-	-	-	SP
NSR-3	40-45	BULK	17.5	-	-	-	-	-	-	-	-	-	-	GM
NSR-3	47-50	BULK	12.1	-	-	-	-	-	-	-	-	-	-	GM
NSR-4	0-5	BULK	-	-	35	39	26	-	-	-	-	-	-	SM*
NSR-4	12	SS	15.5	-	-	-	-	-	-	-	-	-	-	GC
NSR-4	17	SS	-	-	51	30	19	-	-	-	-	-	-	GM*
NSR-4	27	SS	13.5	-	-	-	-	-	-	-	-	-	-	CL
NSR-4	31	SS	22.1	-	-	-	-	21	NP	-	-	-	-	ML*
NSR-4	41	SS	11.1	-	-	-	-	-	-	-	-	-	-	GC
NSR-4	47	SS	13.8	-	-	-	-	-	-	-	-	-	-	GM
NSR-4	59	SS	10	-	-	-	-	-	-	-	-	-	-	GC
NSR-4	70	SS	9.3	-	-	-	-	-	-	-	-	-	-	GC
NSR-4	75	SS	8.3	-	-	-	-	-	-	-	-	-	-	SW
P13-101	10-11.5	SS	55.8	-	4	21.6	74.4	-	-	-	-	-	-	-
P13-101	18.5-20	SS	11.7	-	45	42.9	12.1	-	-	-	-	-	-	-
P13-101	35-36.5	SS	13.6	-	15	73.1	11.9	-	-	-	-	-	-	-
P13-101	40.3-41.8	SS	16.1	-	-	-	-	-	-	-	-	-	-	-
P13-101	45-46.5	SS	14	-	-	-	-	-	-	-	-	-	-	-
P13-101	50-51.5	SS	12.6	-	-	-	-	-	-	-	-	-	-	-
P13-101	60-61.5	SS	16.7	-	-	-	-	-	-	-	-	-	-	-
P13-101	70-71.5	SS	25.8	-	0	82.8	17.2	-	-	-	-	-	-	-
P13-101	80-81.5	SS	22.9	-	-	-	-	-	-	-	-	-	-	-
P13-101	91.3-92.8	SS	22.1	-	-	-	-	-	-	-	-	-	-	-
P13-101	102-103.5	SS	23.2	-	0	80	20	-	-	-	-	-	-	-
P13-101	103-110	SONIC	22.9	-	-	-	20.9	-	-	-	-	-	-	-
P13-102	5-6.5	SS	6.1	-	-	-	-	-	-	-	-	-	-	-
P13-102	7.5-9	SS	316.1	-	-	-	-	NV	NP	-	-	-	-	-
P13-102	15-16.5	SS	12	-	-	-	-	-	-	-	-	-	-	-
P13-102	20-21.5	SS	13.8	-	-	-	-	-	-	-	-	-	-	-
P13-102	25-26.5	SS	20	-	28	64	8	-	-	-	-	-	-	-
P13-102	30-31.5	SS	18.9	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
P13-102	32.5-34	SS	18.6	-	-	-	17.4	-	-	-	-	-	-	-
P13-102	35-36.5	SS	17	-	31	59	10	-	-	-	-	-	-	-
P13-102	37.5-39	SS	15.5	-	-	-	-	-	-	-	-	-	-	-
P13-102	40-41.5	SS	19.3	-	-	-	-	-	-	-	-	-	-	-
P13-102	42.5-44	SS	14	-	-	-	9.3	-	-	-	-	-	-	-
P13-102	45.5-47	SS	23.1	-	-	-	-	-	-	-	-	-	-	-
P13-102	47.5-49	SS	14.4	-	51	37.7	11.3	-	-	-	-	-	-	-
P13-102	50-51.5	SS	17.1	-	-	-	41.6	-	-	-	-	-	-	-
P13-102	55-56.5	SS	16.5	-	-	-	-	-	-	-	-	-	-	-
P13-102	60-62	SS	17.5	-	-	-	12.6	-	-	-	-	-	-	-
P13-102	65-66.5	SS	18.3	-	-	-	-	-	-	-	-	-	-	-
P13-102	70-71.5	SS	15	-	-	-	14.9	-	-	-	-	-	-	-
P13-102	75-76.5	SS	19.9	-	-	-	-	-	-	-	-	-	-	-
P13-102	80-81.5	SS	22.2	-	12	80	8	NV	NP	-	-	-	-	-
P13-102	85-86.5	SS	23.5	-	-	-	-	-	-	-	-	-	-	-
P13-102	90-91.5	SS	23.5	-	-	-	8.5	-	-	-	-	-	-	-
P13-102	95-96.5	SS	25	-	-	-	-	-	-	-	-	-	-	-
P13-102	100-101.5	SS	16.2	-	30	63.2	6.8	-	-	-	-	-	-	-
P13-102	105-106.5	SS	14.5	-	-	-	-	-	-	-	-	-	-	-
P13-102	110-111.5	SS	18.1	-	-	-	9	-	-	-	-	-	-	-
P13-102	115-116.5	SS	18.5	-	-	-	-	-	-	-	-	-	-	-
P13-102	120-121.5	SS	1.8	-	-	-	0.4	-	-	-	-	-	-	-
P13-103	1-2.5	SS	17	-	-	-	-	-	-	-	-	-	-	-
P13-103	6-8.5	SS	178.5	-	-	-	-	-	-	-	-	-	-	-
P13-103	10.5-12	SS	11.6	-	69	24.3	6.7	-	-	-	-	-	-	-
P13-103	13.6-14	SS	15.7	-	-	-	-	-	-	-	-	-	-	-
P13-103	18.8-20.3	SS	10.6	-	-	-	-	-	-	-	-	-	-	-
P13-103	23.6-25	SS	8.6	-	-	-	-	-	-	-	-	-	-	-
P13-103	28.5-30	SS	15.7	-	16	69.4	14.6	-	-	-	-	-	-	-
P13-103	31-32.5	SS	13.2	-	-	-	-	-	-	-	-	-	-	-
P13-103	36-37.5	SS	14.4	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
P13-103	41-42.5	SS	13.9	-	-	-	-	-	-	-	-	-	-	-
P13-103	46-47.5	SS	12.5	-	-	-	-	-	-	-	-	-	-	-
P13-103	50-51.5	SS	16.6	-	-	-	-	-	-	-	-	-	-	-
PDF-1	1	SS	8.5	-	57	31	12	-	-	-	-	-	-	GW-GM*
PDF-1	4	SS	15.5	-	0	72	28	NP	NP	-	-	-	-	SM
PDF-1	11	SS	22.3	-	-	-	-	-	-	-	-	-	-	SM
PDF-1	16	SS	216.7	-	0	57	43	-	-	-	-	-	-	SM
PDF-1	21	SS	46.5	-	-	-	-	-	-	-	-	-	-	SM
PDF-1	33	SS	10.9	-	65	26	9	-	-	-	-	-	-	GW-GM*
PDF-1	38	SS	29.1	-	-	-	-	-	-	-	-	-	-	SW
PDF-1	43	SS	15.5	-	-	-	-	-	-	-	-	-	-	SW
PDF-1	48	SS	23.7	-	1	75	24	-	-	-	-	-	-	SM*
PDF-2	2	SS	17.5	-	-	-	-	NP	NP	-	-	-	-	SM
PDF-2	2-5	BULK	-	-	0	75	25	-	-	-	-	-	-	SM
PDF-2	6	SS	20.4	-	-	-	-	-	-	-	-	-	-	SM
PDF-2	11	SS	29.9	-	-	-	-	-	-	-	-	-	-	SM
PDF-2	10-15	BULK	-	-	0	63	37	-	-	-	-	-	-	SM
PDF-2	17	SS	55.9	-	-	-	-	-	-	-	-	-	-	SM
PDF-2	21	SS	62.6	-	-	-	-	-	-	-	-	-	-	SM
PDF-2	20-25	BULK	-	-	4	51	45	-	-	-	-	-	-	SM
PDF-2	28	SS	41	-	-	-	-	-	-	-	-	-	-	GW-GM
PDF-2	27-30	BULK	-	-	66	18	16	-	-	-	-	-	-	GM*
PDF-3	0-3.5	BULK	-	-	34	51	15	-	-	131.7	7.8	-	-	SM*
PDF-3	4	SS	19	-	-	-	-	27	NP	-	-	-	-	GC
PDF-3	9	SS	30.2	-	-	-	-	-	-	-	-	-	-	SM
PDF-3	10-12	BULK	-	-	0	8	92	-	-	-	-	-	-	ML*
PDF-3	19	SS	39.5	-	-	-	-	-	-	-	-	-	-	SM
PDF-3	24	SS	53.7	-	-	-	-	40	NP	-	-	-	-	ML-OL
PDF-3	23-25	BULK	-	-	0	16	84	-	-	-	-	-	-	ML-OL
SSR-1	1	SS	9.6	-	-	-	-	29	12	136.8	6.8	-	-	CL
SSR-1	7	SS	9.5	-	-	-	-	-	-	-	-	-	-	CL

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
SSR-1	10	SS	4	-	60	27	13	24	NP	-	-	-	-	GC*
SSR-1	17	SS	8.2	-	-	-	-	-	-	-	-	-	-	CL
SSR-1	24	SS	12.1	-	-	-	-	-	-	-	-	-	-	CL
SSR-1	30	SS	10	-	-	-	-	-	-	-	-	-	-	CL
SSR-1	35	SS	11	-	-	-	-	-	-	-	-	-	-	CL
SSR-1	48	SS	5.8	-	-	-	-	-	-	-	-	-	-	CL
SSR-1	57	SS	9.7	-	-	-	-	-	-	-	-	-	-	SW
SSR-1	63	SS	11.3	-	-	-	-	-	-	-	-	-	-	GM
SSR-1	76	SS	16	-	-	-	-	-	-	-	-	-	-	SM
SSR-1	90	SS	10.7	-	-	-	-	-	-	-	-	-	-	SW
SSR-101	0-1.5	SS	14	-	48	33.9	18.1	-	-	-	-	-	-	-
SSR-101	2.5-4	SS	13.9	-	-	-	-	-	-	-	-	-	-	-
SSR-101	5-6.5	SS	27.5	-	-	-	-	-	-	-	-	-	-	-
SSR-101	7.5-9	SS	12.9	-	-	-	-	-	-	-	-	-	-	-
SSR-101	10-11.5	SS	13.1	-	42	37.3	20.7	-	-	-	-	-	-	-
SSR-101	12.5-14	SS	17.4	-	-	-	-	-	-	-	-	-	-	-
SSR-101	15-16.5	SS	15.9	-	-	-	-	-	-	-	-	-	-	-
SSR-101	17.5-19	SS	9	-	-	-	-	-	-	-	-	-	-	-
SSR-101	20-21.5	SS	24	-	-	-	-	-	-	-	-	-	-	-
SSR-101	25-25.5	SS	6.8	-	-	-	-	-	-	-	-	-	-	-
SSR-101	27.5-29	SS	10.8	-	40	37.8	22.2	-	-	-	-	-	-	-
SSR-101	28-28.5	SS	34.7	-	-	-	-	-	-	-	-	-	-	-
SSR-101	28.5-29	SS	44.9	-	-	-	-	-	-	-	-	-	-	-
SSR-101	31.5-32.5	SS	9.6	-	-	-	-	-	-	-	-	-	-	-
SSR-101	35-36.5	SS	13.7	-	-	-	-	-	-	-	-	-	-	-
SSR-101	45-46.5	SS	30.7	-	-	-	13.5	-	-	-	-	-	-	-
SSR-101	50-51.5	SS	15.8	-	-	-	-	-	-	-	-	-	-	-
SSR-101	56.5-58	SS	14	-	-	-	-	-	-	-	-	-	-	-
SSR-101	60-61.5	SS	17	-	-	-	-	-	-	-	-	-	-	-
SSR-101	65-66.5	SS	12.4	-	-	-	16	-	-	-	-	-	-	-
SSR-101	70-71.5	SS	24.8	-	0	80.6	19.4	-	-	-	-	-	-	-

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
SSR-101	75-76.5	SS	24	-	-	-	15.3	-	-	-	-	-	-	-
SSR-101	80-81.5	SS	25	-	-	-	-	-	-	-	-	-	-	-
SSR-101	85-86.5	SS	23.5	-	-	-	8.1	-	-	-	-	-	-	-
SSR-101	91.4-92.9	SS	22	-	-	-	-	-	-	-	-	-	-	-
SSR-101	95-96.5	SS	14.6	-	-	-	-	-	-	-	-	-	-	-
SSR-101	100-101.5	SS	13.3	-	9	84.7	6.3	-	-	-	-	-	-	-
SSR-101	105-106.5	SS	18.4	-	-	-	-	-	-	-	-	-	-	-
SSR-101	110-111.5	SS	18.1	-	-	-	-	-	-	-	-	-	-	-
SSR-101	115-116.5	SS	26.5	-	-	-	10.4	NV	NP	-	-	-	-	-
SSR-101	120-121.5	SS	16.3	-	-	-	-	-	-	-	-	-	-	-
SSR-101	125-126.5	SS	31.8	-	-	-	54.7	-	-	-	-	-	-	-
SSR-101	132-133.5	SS	26.5	-	-	-	-	-	-	-	-	-	-	-
SSR-101	137-138.5	SS	21.6	-	-	-	-	-	-	-	-	-	-	-
SSR-101	156-157.5	SS	6.8	-	-	-	-	-	-	-	-	-	-	-
SSR-101	160.5-162	SS	34.3	-	-	-	-	-	-	-	-	-	-	-
SSR-102	2.5-4	SS	7.9	-	26	47	27	-	-	-	-	-	-	-
SSR-102	5-6.5	SS	11.2	-	-	-	-	-	-	-	-	-	-	-
SSR-102	7.5-9	SS	14.7	-	-	-	-	-	-	-	-	-	-	-
SSR-102	10-11.5	SS	12.1	-	42	36.4	21.6	NV	NP	-	-	-	-	-
SSR-102	12.5-14	SS	8	-	-	-	-	-	-	-	-	-	-	-
SSR-102	15-16.5	SS	11.1	-	-	-	11.4	-	-	-	-	-	-	-
SSR-102	17.5-19	SS	12.1	-	-	-	-	-	-	-	-	-	-	-
SSR-102	20-21.5	SS	19.4	-	-	-	-	-	-	-	-	-	-	-
SSR-102	24.5-26	SS	14.9	-	52	33.1	14.9	-	-	-	-	-	-	-
SSR-102	27.5-29	SS	25.3	-	-	-	-	-	-	-	-	-	-	-
SSR-102	32.5-34	SS	16.2	-	35	35.8	29.2	-	-	-	-	-	-	-
SSR-102	45.5-46.5	SS	17.7	-	-	-	-	-	-	-	-	-	-	-
SSR-102	50.5-52	SS	19.1	-	-	-	19.1	-	-	-	-	-	-	-
SSR-102	57-58.5	SS	15.9	-	-	-	15.9	-	-	-	-	-	-	-
SSR-102	61-62.5	SS	17.5	-	-	-	17.5	-	-	-	-	-	-	-
SSR-102	66.5-68	SS	25.4	-	-	-	25.4	-	-	-	-	-	-	-

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
SSR-102	71.5-73	SS	25.5	-	-	-	-	-	-	-	-	-	-	-
SSR-102	76.5-78	SS	24.5	-	-	-	-	NV	NP	-	-	-	-	-
SSR-102	81.5-83	SS	25.5	-	-	-	79	NV	NP	-	-	-	-	-
SSR-102	86.5-88	SS	25.9	-	-	-	-	-	-	-	-	-	-	-
SSR-102	91.5-93	SS	24.8	-	-	-	94.6	-	-	-	-	-	-	-
SSR-102	96.5-98	SS	21.2	-	-	-	51.4	-	-	-	-	-	-	-
SSR-102	101.5-103	SS	27.4	-	-	-	83.2	NV	NP	-	-	-	-	-
SSR-102	106.5-108	SS	31	-	-	-	-	-	-	-	-	-	-	-
SSR-102	111.5-113	SS	26.9	-	-	-	52.5	-	-	-	-	-	-	-
SSR-102	121.5-123	SS	10.6	-	42	45.7	12.3	-	-	-	-	-	-	-
SSR-102	126.5-128	SS	17.4	-	-	-	-	-	-	-	-	-	-	-
SSR-102	136-136.3	SS	7.7	-	-	-	-	-	-	-	-	-	-	-
SSR-103	0-5	BAGGIE	11.3	-	-	-	-	-	-	-	-	-	-	-
SSR-103	10-13	BAGGIE	12.3	-	-	-	-	-	-	-	-	-	-	-
SSR-103	25-30	BAGGIE	7.2	-	-	-	-	-	-	-	-	-	-	-
SSR-103	5-35	BULK	2.4	-	43	37.1	19.9	28	8	-	-	-	-	-
SSR-103	60-65	BAGGIE	10.8	-	-	-	-	-	-	-	-	-	-	-
SSR-103	37-70	BULK	6.5	-	29	42	29	-	-	-	-	-	-	-
SSR-103	80-86	BAGGIE	11.1	-	-	-	-	-	-	-	-	-	-	-
SSR-103	70-87	BULK	8.8	-	17	47.9	35.1	-	-	-	-	-	-	-
SSR-104	0-5	SONIC	6.7	-	44	34.5	21.5	-	-	-	-	-	-	-
SSR-104	5-8	SONIC	5.4	-	52	28.4	19.6	-	-	-	-	-	-	-
SSR-104	8-10	SS	15.5	-				-	-	-	-	-	-	-
SSR-104	10-15	SS	41.8	-				-	-	-	-	-	-	-
SSR-104	17.5-20	SONIC	5.6	-	51	33.7	15.3	NV	NP	-	-	-	-	-
SSR-104	17.5-32.5	SONIC	-	-	-	-	-	-	-	131.5	8.1	-	2.65	-
SSR-104	20-22.5	SS	8.1	-	-	-	-	-	-	-	-	-	-	-
SSR-104	22.5-25	SONIC	4.9	-	-	-	20.5	-	-	-	-	-	-	-
SSR-104	25-27.5	SS	8.3	-	-	-	-	-	-	-	-	-	-	-
SSR-104	30-32.5	SONIC	7	-	-	-	16.5	-	-	-	-	-	-	-
SSR-104	32.5-35	SONIC	8.2	-	-	-	-	26	7	-	-	-	-	-

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
SSR-104	35-40	SS	1.3	-	-	-	-	-	-	-	-	-	-	-
SSR-104	40-45	SONIC	10	-	41	38.3	20.7	NV	NP	-	-	-	-	-
SSR-104	45-47.5	SONIC	11.5	-	-	-	25.7	-	-	-	-	-	-	-
SSR-104	47.5-48.5	SS	10.3	-	-	-	-	-	-	-	-	-	-	-
SSR-104	48.5-50	SONIC	7.1	-	-	-	23	-	-	-	-	-	-	-
SSR-104	50-52.5	SONIC	12.4	-	47	34.3	18.7	27	9	-	-	-	-	-
SSR-104	52.5-55	SS	8.1	-	-	-	-	-	-	-	-	-	-	-
SSR-104	55-56.5	SONIC	9.3	-	-	-	24.1	-	-	-	-	-	-	-
SSR-104	56.5-60	SS	8.5	-	-	-	-	-	-	-	-	-	-	-
SSR-104	60-62.5	SONIC	13.6	-	-	-	20.6	-	-	-	-	-	-	-
SSR-104	62.5-65	SONIC	6.4	-	52	32.1	15.9	27	7	-	-	-	-	-
SSR-104	65-70	SONIC	4.9	-	-	-	16.6	-	-	-	-	-	-	-
SSR-104	70-71.5	SS	7.5	-	-	-	-	-	-	-	-	-	-	-
SSR-104	71.5-75	SONIC	8.8	-	-	-	18.5	-	-	-	-	-	-	-
SSR-104	76.5&77.5-8	SONIC	10.7	-	42	33	25	33	10	-	-	-	-	-
SSR-104	76.5-77.5	SS	8	-	-	-	-	-	-	-	-	-	-	-
SSR-104	81.5-85	SONIC	7.6	-	-	-	18	-	-	-	-	-	-	-
SSR-104	85-89	SONIC	8.9	-	41	31.1	27.9	28	9	-	-	-	-	-
SSR-104	89-93	SONIC	10	-	-	-	34.5	-	-	-	-	-	-	-
SSR-104	93-96	SS	3.2	-	-	-	-	-	-	-	-	-	-	-
SSR-104	96-102	SONIC	4.4	-	-	-	14.3	-	-	-	-	-	-	-
SSR-104	102-104	SONIC	9.7	-	-	-	-	30	11	-	-	-	-	-
SSR-2	2	SS	9.8	-	-	-	-	28	9	-	-	-	-	CL-OL*
SSR-2	0-6	BULK	-	-	-	-	-	-	-	118.8	10.4	-	-	ML
SSR-2	7	SS	6.9	-	-	-	-	28	10	-	-	-	-	CL
SSR-2	6-12	BULK	-	-	-	-	-	-	-	121.1	9.9	-	-	CL
SSR-2	12	SS	7.9	-	-	-	-	-	-	-	-	-	-	CL
SSR-2	17	SS	12.4	-	-	-	-	-	-	-	-	-	-	CL
SSR-2	24	SS	16	-	-	-	-	-	-	-	-	-	-	CL
SSR-2	31	SS	20.5	-	-	-	-	28	11	11	-	-	-	CL*
SSR-2	36	SS	28.8	-	-	-	-	-	-	-	-	-	-	GC

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
SSR-2	66	SS	10.4	-	56	30	14	-	-	-	-	-	-	GM
SSR-2	75	SS	37.7	-	55	34	11	-	-	-	-	-	-	GM
SSR-3	2	SS	-	-	-	-	-	-	-	-	-	-	-	GW-GC
SSR-3	8	SS	-	-	-	-	-	-	-	-	-	-	-	GC
SSR-3	13	SS	15.4	-	-	-	-	-	-	-	-	-	-	CL
SSR-3	18	SS	-	-	-	-	-	-	-	-	-	-	-	CL
SSR-3	30	SS	15	-	-	-	-	-	-	-	-	-	-	CL
SSR-3	37	SS	20.2	-	-	-	-	-	-	-	-	-	-	GC
SSR-3	39	SS	11.1	-	-	-	-	-	-	-	-	-	-	GW-GC
SSR-3	53	SS	11.6	-	-	-	-	-	-	-	-	-	-	GW-GC
SSR-3	70	SS	8.1	-	-	-	-	-	-	-	-	-	-	GW-GC
SSR-3	76	SS	7.5	-	-	-	-	-	-	-	-	-	-	SP
SSR-3	87A	SS	7.9	-	-	-	-	-	-	-	-	-	-	SP
SSR-3	87B	SS	8.5	-	-	-	-	-	-	-	-	-	-	SP
SSR-3	91	SS	19.3	-	-	-	-	-	-	-	-	-	-	SW
SSR-3	95	SS	18.5	-	-	-	-	-	-	-	-	-	-	SP-SM
SSR-4	0-4	BULK	7.5	-	36	38	26	24	4	126.6	10.3	-	-	SM*
SSR-5	0-4	BULK	6.5	-	57	33	10	-	-	132.8	7.3	-	-	GW-GM*
SSR-5	6	SS	12.4	-	21	48	31	25	2	-	-	-	-	SM*
SSR-5	9	SS	29.3	-	12	23	65	-	-	-	-	-	-	ML*
SSR-5	13	SS	25.6	-	-	-	-	-	-	-	-	-	-	SM
SSR-5	17	SS	42.9	-	1	30	69	-	-	-	-	-	-	ML*
SSR-5	22	SS	76.7	-	2	42	56	-	-	-	-	-	-	ML*
SSR-5	27	SS	13.2	-	-	-	-	21	1	-	-	-	-	GC
SSR-5	32	SS	10.3	-	-	-	-	-	-	-	-	-	-	-
SSR-5	40	SS	23.8	-	-	-	-	-	-	-	-	-	-	SW
SSR-5	40-45	BULK	-	-	4	85	11	-	-	-	-	-	-	SW-SM*
SSR-5	48	SS	26.9	-	-	-	-	-	-	-	-	-	-	SP
SSR-5	47-50	BULK	-	-	0	61	39	-	-	-	-	-	-	SM*
SSR-5	57	SS	27.9	-	-	-	-	-	-	-	-	-	-	SM
SSR-5	55-60	BULK	-	-	0	51	49	-	-	-	-	-	-	SM

Table 1 - Summary of 2011 Laboratory Index Test Results

Sample Location			ASTM D2216	ASTM D6938	CP-31[1]			ASTM D4318		ASTM D698		Hand Penet.	AASHTO T85	USCS
Boring/ Test Pit	Depth (ft)	Type	Natural Moisture Content (%)	Dry Unit Weight (pcf)	Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PI	MDD (pcf)	OMC (%)	Unconfined Compressive Strength (psf)	Specific Gravity	Soil Classification
TP2004A1	-	BULK	14.9	-	59	28	13	26	8	-	-	-	-	-
TP2004B	-	BULK	13.8	-	64	24	12	31	11	-	-	-	-	-
TP2004C	-	BULK	11.8	-	46	32	22	26	8	-	-	-	-	-
TP2004D	-	BULK	9.2	-	32	44	24	21	4	-	-	-	-	-

Notes:

[1] CP-31 is a sieve analysis method established by the Colorado Department of Transportation that modifies AASHTO T11 and T27.

Table 2 - Embankment Fill – Direct Shear Test Results

	85 % Standard Proctor at Optimum Moisture Content		95% Standard Proctor at Optimum Moisture Content	
Test Pit	2-point envelope	3-point envelope	2-point envelope	3-point envelope
TP2011-03	40° / 280 psf	NT	44° / 800 psf	NT
TP2011-04	38°/ 410 psf	41° / 260 psf	42° / 600 psf	NT
TP2011-06	40° / 290 psf	NT	45° / 780 psf	53° / 240 psf
TP2011-08	37° /160 psf	38°/ 80 psf	47° / 500 psf	52° / 130 psf

Notes:

NT = case not tested

Table 3A. IDF Solids - Specific Gravity and Atterberg Lir

Cell/Location Number	Specific Gravity	Atterberg Limits (%)		
		LL	PL	PI
1A (Round 8)	2.95	-	-	-
3A (Round 8)	2.99	-	-	-
Pond 18 (0-30")	3.00	67	62	5
Pond 18 (0-30")	2.99	83	79	4
Pond 18 (12-42")	3.00	77	74	3

Table 3B. IDF Solids - Moisture Content (%) / Dry Unit Weight (pcf)

	Round Number								
Cell/Location Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1									
A	169.8/27.6		257.9/20.8	214.9/22.3	210.3/25.4	133.0/31.0		217.7/23.8	95.5/48.4
B	189.0/27.8	382.6/-	183.2/27.2	150.0/32.4			145.1/33.7	27.6/87.2	86.2/41.5
C	111.6/42.7				98.1/44.3	87.8/47.1	71.5/47.4		
2									
A	129.4/38.7	302.0/-	93.4/14.0	104.1/38.5		122.4/32.4		50.0/68.0	148.4/28.4
B	320.4/22.3		238.8/21.0	158.5/31.5	240.6/26.8		218.5/24.1		195.9/32.6
C	129.8/38.0				212.8/23.1	80.5/52.9	95.1/45.3	277.9/20.7	
3									
A	314.18.5	357.4/-		241.0/20.8	233.7/22.7	261.6/21.0		78.3/30.9	223.3/24.2
B	141.2/32.2		261.2/20.9	247.4/22.9			234.2/21.6	207.5/25.3	117.9/32.9
C	248.2/21.3		237.8/22.0		202.0/26.8	239.8/22.1	219.3/23.8		
4									
A	227.8/23.8		197.0/26.1		184.7/25.3	211.8/25.4	206.8/27.6		215.8/26.7
B	170.1/28.9	273.1/-	205.0/23.4	330.1/16.6				207.4/23.3	
C	196.6/27.0			268.1/20.2	255.4/19.5	232.4/21.1	223.9/21.4	192.5/22.5	221.5/22.6

Table 3C. IDF Solids - Undrained Shear Strength (Peak/Residual - psf)

	Round Number								
Cell/Location Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1									
A			211/53			426/168			391/96
B		238/48		437/65				210/46	
C					134/24		592/53		
2									
A		143/30		425/46				119/25	
B			142/40				327/44		210/67
C					310/57	135/20			
3									
A		189/50			387/74			173/52	
B				278/52			238/38		150/65
C			107/31			226/50			
4									
A			538/85		276/64		365/65		
B		262/44						246/33	
C				468/50		189/59			127/35

Table 3D. IDF Solids - Hydraulic Conductivity (cm/sec)

Cell/Location Number	Round Number								
	1	2	3	4	5	6	7	8	9
1									
A	1.0E-05								
B			8.9E-07						3.9E-06
C							2.3E-06		
2									
A		8.3E-07							
B				6.6E-06					
C								5.8E-05	
3									
A		6.6E-07						1.1E-05	
B			1.1E-06						
C									
4									
A	2.8E-04						2.8E-06		
B									
C				2.5E-06					4.3E-06

Table 3E. IDF Solids - Consolidation Data

Round Number	Cell	e_0	e_f	Cc	Cr	σ'_v,mp (psf)	σ'_v,max (psf)
1	1A	10.5	5.0	5.7	0.06	1200	5000
1	3A	5.3	4.6	1.2	0.10	1500	5000
1	4A	4.9	3.6	1.5	0.08	1100	5000
2	1B	8.2	4.8	4.0	0.10	900	5000
2	2B	2.7	2.1	1.4	0.02	1000	5000
4	1B	9.2	5.4	5.0	0.15	950	5000
4	3B	6.5	4.9	3.1	0.12	1700	5000
5	2B	7.8	6.9	1.9	0.12	1600	2500
5	4A	6.0	4.5	2.9	0.08	1500	2500
6	1C	3.2	2.9	0.5	0.02	1600	5000
6	3C	4.7	3.1	2.2	0.06	1100	5000
7	2C	2.5	2.3	0.5	0.12	1500	5000
7	4C	3.7	3.3	0.5	0.05	1100	5000
8	1A	6.7	6.2	1.5	0.11	1900	5000
8	3A	4.5	3.9	1.3	0.06	1800	5000
9	2A	5.7	4.3	2.5	0.11	1400	5000
9	4A	5.7	5.0	1.7	0.09	1700	5000

Table 3F. IDF Solids - Triaxial Test Results

Round Number	Cell	e_0	e_f	Φ'	c' (psf)	σ'_c (psf)
1	1A	5.8	3.3	29.6	55	300, 1600, 4000
1	4A	8.4	3.8	28.7	76	800, 1600, 4000
2	3A	7.1	5.1	29.2	157	700, 1600, 4000
4	1B	4.6	3.4	26.2	220	700, 1600, 4000
4	4B	9.4	4.3	28.2	302	700, 1600, 4000
6	2A	5.0	3.8	29.5	124	700, 1600, 4000
6	3C	8.3	4.8	27.3	179	700, 1600, 4000
7	4C	7.3	3.7	29.8	100	700, 1600, 4000
7	1C	6.7	3.2	29.2	137	300, 1600, 4000
8	2C	8.1	4.7	29.5	137	300, 1600, 4000
8	3B	6.2	2.6	31.1	64	300, 1600, 4000
9	1A	3.0	2.3	32.1	246	300, 1600, 4000
9	4A	6.6	4.1	28.8	254	300, 1500, 4000

Table 4 - Groundwater Well Elevations, Rico Colorado

Date	GW-2	GW-3	GW-5	GW-6	GW-7	GW-8	MW-1 DEEP	MW-1 SHALLOW	MW-4 DEEP	MW-4 SHALLOW	MW-5 DEEP	MW-5 SHALLOW	MW-6 DEEP	MW-6 SHALLOW	MW-101	MW-102	MW-202	P13-102	P13-103
Oct-02	8826.50	8831	8823.5	8823	8820.00	8806.00													
Nov-04	8824.48	8823.73	8819.88	8822.49	8818.70	8810.62													
May-05	8829.14	8826.11	8824.79	8823.85	8825.05	8821.34													
Aug-05	8827.56	8825.83	8822.44	8822.20	8822.69	8817.57													
Jan-06	8824.10	8823.56	8818.60	8818.76	8817.25	8814.98													
Jul-06	8825.65	8823.81	8819.91	8818.80	8818.61	8815.77													
Jul-10																			
Jul-10			8820.48	8814.35	8819.87														
Jul-10			8820.14	8814.07	8819.35														
Aug-10			8820.27	8817.76	8818.96														
Sep-10			8819.666	8817.33	8818.52														
Oct-10			8819.27	8816.68	8818.04														
Nov-10			8817.875	8816.03	8817.23														
Dec-10			8817.72	8815.97	8818.89														
Jan-11			8818.27																
Feb-11																			
Mar-11			8817.66																
Apr-11			8819.79	8817.73	8819.19														
Apr-11			8820.02	8816.3	8819.34														
Apr-11			8820.33	8816.55	8819.64														
May-11		8825.38	8821.02	8818.81	8815.85														
Jun-11		8825.59	8821.65	8817.78	8821.95														
Jul-11		8824.62	8820.07	8816.33	8820.14														
Aug-11		8824.01	8819.04	8815.32	8818.93														
Sep-11		8823.83	8818.37	8814.48	8817.89														
Oct-11		8823.89	8818.32	8816.68	8817.38														
Nov-11		8823.81	8818.09	CNO	8817.41		8802.38	8804.63	8800.32	8800.02	8813.67	8815.1	8807.37	8807.74					
Dec-11		8823.78	8817.65	CNO	8817.00		8801.86	8804.56	8799.89	8799.88	8813.4	8814.76	8806.95	8807.35					
Jan-12		8823.68	8817.30	CNO	8816.80		8801.71	8804.49	8799.76	8799.76	8813.15	8814.40	8806.72	8807.07					
Feb-12		8823.68	8817.30	CNO	8816.80		8801.72	8804.53	8799.81	8799.78	8813.12	8814.15	8806.70	8807.09					
Mar-12		8824.02	8818.22	CNO	8817.08		8801.99	8804.68	8800.23	8800.24	8813.67	8814.24	CNO	8807.78					
Apr-12		8824.33	8819.48	CNO	8819.30		8802.14	8804.71	8800.51	8798.54	8814.54	8816.03	8808.30	8808.93					
May-12		8823.00	8818.85	CNO	8820.48		8802.40	8804.72	8800.40	8800.42	8814.19	8815.59	8807.74	8808.23					
Jun-12		8823.87	8818.29	CNO	8817.79		8801.91	8804.68	8799.98	8800.00	8813.78	8815.20	8807.27	8807.72					
Jul-12		8822.89	8817.95	CNO	8817.42		8801.86	8804.48	8799.95	8799.99	8813.57	8815.05	8807.21	8807.62					
Aug-12		8821.82	8817.62	8815.98	8817.09		8801.81	8804.23	8799.97	8799.98	8813.39	8814.86	8807.13	8807.47					
Sep-12		8822.88	8817.28	8815.72	8816.91		8802.44	8804.93	8799.76	8799.76	8813.16	8814.57	8806.80	8807.20					
Oct-12		8823.24	8818.56	8816.67	8817.09		8801.59	8804.68	8800.09	8800.11	8813.84	8814.51	8807.25	8807.68					
Nov-12		8822.86	8818.02	8815.24	8817.12		8800.47	8804.27	8799.85	8799.85	8813.55	8814.52	8806.55	8807.45	8818.15	8817.50	CNO	8800.04	8800.58
Dec-12		8823.70	8817.36	8815.77	8816.86		8801.14	8804.30	8799.74	8799.75	8813.17	8813.39	CNO	8807.18	8817.64	8817.05	CNO	8799.93	8800.45
Jan-13		8823.59	8816.92	8815.43			8801.09	8804.21	8799.62	8799.62	8812.92	8813.99	8806.61	8806.9	8818.32	8816.66	CNO	8799.83	8800.35
Feb-13		8823.71	8817.00	CNO	8816.59		8801.10	8804.22	8799.61	8799.61	8812.94	8813.83	8806.51	8806.75	8817.02	8816.67	CNO	8799.85	8800.36
Mar-13		8823.65	8817.07	CNO	8816.49		8801.53	8803.89	8799.66	8799.64	8812.89	8813.65	8806.57	8806.86	8817.137	8816.494	CNO	8799.893	8800.394
Apr-13		8824.17	8817.92	8816.91	8817.11		8801.96	8804.3	8800.44	8800.44	8813.93	8815.17	8807.81	8808.24	8818.417	8817.734	8825.606	8800.523	8801.354
May-13							8802	8804.49	8800.28	8800.29	8813.82	8815.19	8807.44	8807.82	8818.61	8817.93	8824.51	8800.57	8801.1

Table 4 - Groundwater Well Elevations, Rico Colorado

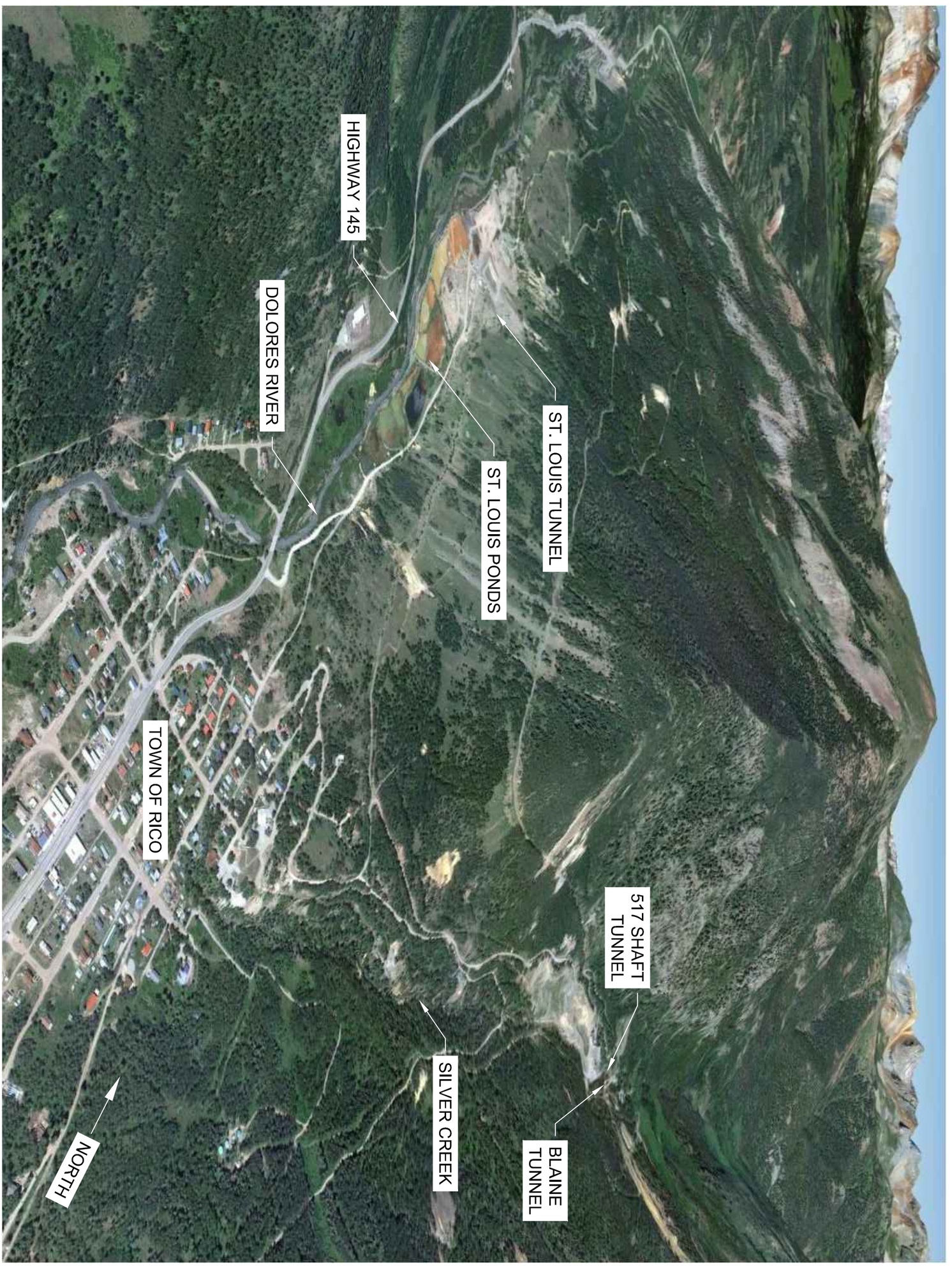
Date	GW-2	GW-3	GW-5	GW-6	GW-7	GW-8	MW-1 DEEP	MW-1 SHALLOW	MW-4 DEEP	MW-4 SHALLOW	MW-5 DEEP	MW-5 SHALLOW	MW-6 DEEP	MW-6 SHALLOW	MW-101	MW-102	MW-202	P13-102	P13-103
Average	8826.24	8824.13	8819.05	8817.34	8818.43	8814.38	8801.74	8804.47	8799.99	8799.88	8813.51	8814.64	8807.11	8807.53	8817.90	8817.15	8825.06	8800.09	8800.66
Max	8829.14	8831.00	8824.79	8823.85	8825.05	8821.34	8802.44	8804.93	8800.51	8800.44	8814.54	8816.03	8808.30	8808.93	8818.61	8817.93	8825.61	8800.57	8801.35
Min	8824.10	8821.82	8816.92	8814.07	8815.85	8806.00	8800.47	8803.89	8799.61	8798.54	8812.89	8813.39	8806.51	8806.75	8817.02	8816.49	8824.51	8799.83	8800.35

Notes:

CNL - Could Not Locate

CNO - Could Not Observe

Figures



IMAGERY COURTESY OF GOOGLE EARTH PRO

RICO-ARGENTINE SITE-OU01

SOLIDS REPOSITORY ELAVUATION AND PRELIMINARY DESIGN REPORT

FIGURE 1 - SITE LOCATION

AECOM

SEPTEMBER 2013

60301339

Filename: Z:_CURRENT_PROJECTS\ATLANTIC RICHFIELD\60157757 RICO\000_CADD\06-EXHIBITS\32-2013 REPOSITORY OPTIONS\FIG-2_GEOLOGIC-MAP_RICO-SOLIDS-PDR.DWG Last saved by: RODDENA Last Plotted: 8/30/2013 1:01 PM Project Management Initials: Designer: ____ Checked: ____ Approved: ____ ANSI B 11" x 17"

UPPER NORTH STAGING/ DRYING FACILITY

NORTH STACKED REPOSITORY

SOIL LEAD REPOSITORY

ST. LOUIS TUNNEL

SOUTH STACKED REPOSITORY ALTERNATIVE A

SOUTH STACKED REPOSITORY ALTERNATIVE B

INTERIM DRYING FACILITY (FORMER PONDS 16/17)

POND 13 REPOSITORY

DOLORES RIVER

HIGHWAY 145

18 15 14 12 13 11 10 9 8 7 6 5

LEGEND:

- DA (Qal) - Disturbed (graded) area with minimal fill placement (estimated <3 feet) (Alluvium)
- DA (Qc) - Disturbed (graded) area with minimal fill placement (estimated <3 feet) (Colluvium)
- DA (Qls/Qc) - Disturbed (graded) area with minimal fill placement (estimated <3 feet) (Landslide Deposit)
- DA (Qlso) - Disturbed (graded) area with minimal fill placement (estimated <3 feet) (Older Landslide Deposit)
- Pond Temporarily Drained
- F - Fill (undifferentiated)
- MW - Fill composed predominately of undifferentiated mine waste material
- MW/C - Fill composed predominately of undifferentiated mine waste material/Calcines
- RR1 - Riprap composed of angular rock boulders
- RR2 - Riprap composed of rounded boulders derived from stream channel (i.e., dike)
- C - Calcines
- WR - Waste Rock
- Qal - Alluvium
- Qc - Colluvium locally includes talus and small debris slides
- Qlsa - Active landslide deposit - evidence of recent activity (within the last several years)
- Qls - Landslide deposit - evidence of historic activity (within the last several decades)
- Qlso - Older landslide deposit - surficial features suggest material probably has not moved in the past several decades or more
- tr - travertine deposit associated with leaking seals on abandoned deep exploratory core holes
- Phl - Hermosa Formation, lower member: consists of sandstone, siltstone, shale and arkose with local limestone and conglomerate beds. Locally includes discontinuous intrusions (i.e., sills and dikes) of hornblende latite porphyry.
- g - Greenstone: dark greenish -gray fine grained rock with mica, chlorite and epidote.
- W - Water

N

0 300'

RICO-ARGENTINE SITE-OU01

SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT

FIGURE 2 - GEOLOGIC MAPPING

AECOM

SEPTEMBER 2013

60301339

LEGEND

(15) POND NUMBER

2011-PRESENT FIELD INVESTIGATIONS

- PROPOSED 2013 SOIL BORINGS/MONITORING WELLS
- TEST PIT
- EXPLORATORY BORING
- MONITORING WELL
- REFRACTION MICROTREMOR GEOPHYSICAL PROFILES
- (CPT) CPT PERFORMED ADJACENT TO BORING
- * APPROXIMATE LOCATION

PRE-2011 FIELD INVESTIGATIONS

- DH-1 (ANDERSON ENGINEERING/SEH, 2008)
- B-1 (DAMES AND MOORE, 1981)
- EH-1 (ANACONDA MINERALS)
- DOMESTIC WELLS
- TP-1 (ANDERSON ENGINEERING/SEH, 2008)
- TP-2004A (SEH, 2004)
- TP-A (SEH, 2001)
- APB-1 (ANDERSON ENGINEERING, 1996)

ST. LOUIS ADIT (APPROXIMATE CENTERLINE)

SOUTH STACKED REPOSITORY ALTERNATIVE A

SOUTH STACKED REPOSITORY ALTERNATIVE B

NORTH STACKED REPOSITORY

SOIL LEAD REPOSITORY

POND 13 REPOSITORY

UPPER NORTH STAGING/ DRYING FACILITY

SITE ACCESS ROAD

DOLORES RIVER

SSR-1, TP-17, SSR-103, DH-12, TP2011-18, MW-101 (SSR-101), TP-21, TP-19, SSR-2, GW7, B-3, SSR-104, TP2011-19, TP-16, B-4, TP-20, MW-102, AR-104, SSR-102, CPT-4, TP-13, GW8, SSR-5(CPT), TP-15, TP2004H, CPT-6, PDF-3(CPT), MW-6S/D, P13-104, MW-4S/D, TP2011-01, TP-8, TP2011-04, DH-4, ED-108, ED-4(CPT), RM-5, ED-103, MW-105, ED-102, P13-101, TP-5, DH-3, DH-3R, P13-103, DH-10, TP2011-08, CPT-1, ED-109, TP2011-02, P13-102, MW-1S/D, TP-28, TP2011-12, RM-6, TP2011-13, NSR-1, NSR-4, TP2011-14, TP2004C, TP2004D, NSR-2(CPT), NSR-3, DG-3, APB-1, GW1, APB-2, APB-3, APB-4, ADF/R-2(CPT), TP2011-15, RM-101, GW2, TP2011-16, RM-1, ADF/R-1(CPT), TP2011-10, GW3, MW-202, TP2011-17, TP-18, TP-22, SSR-3, RM-2, GW5, EB-1, TP2004F, CPT-5, TP-14, PDF-2, TP2004G, DH-12R, B-5, B-1, B-2, TP-C, SSR-4, GW6, CPT-3, EB-2, DH-11, EB-2D, TP-B, MW-5S/D, RM-4, TP2004I, CPT-2, 9, 10, 11, 12, 13, 14, 15, 18

0 200' 400'

SCALE: 1" = 200'

RICO-ARGENTINE SITE-OU01

SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT

FIGURE 3 - GEOTEHCNICAL INVESTIGATION LOCATION MAP

AECOM

SEPTEMBER 2013

60301339

Filename: Z:\...\CURRENT_PROJECTS\ATLANTIC RICH\FIELD\60157757 RICO\000_CAD\09-EXHIBITS\2-2013 REPOSITORY OPTIONS\FIG-3_GEOTECH-INVESTIGATION_RICO-SOLIDS-PDR.DWG Last saved by: RODGERA Last Plotted: 9/30/2013 2:29 PM

Project Management Initials: Designer: Checked: Approved: ANSI D 22" x 34"

STACKED SOLID REPOSITORY ALTERNATIVES			
REPOSITORY SITE	PHASE 1	ADDITIONAL PHASES	CUMULATIVE TOTAL
SSR-A ALT-A	±32K CY	±305K CY	±337K CY
NSR	±96K CY	±215K CY	±311K CY
POND 13	±41K CY	N/A	±41K CY
DRYING/STAGING/STOCKPILE FACILITY			
UPPER NORTH	±16K CY (DRYING/STAGING/STOCKPILE ONLY)		

NORTH STACKED REPOSITORY PHASE 1

NORTH STACKED REPOSITORY PHASE 2 (3H:1V STACK)

APPROXIMATE LIMITS OF EXISTING REALM SUBDIVISION RIGHT-OF-WAY

"MARTHA LODE"

"MERVIN LODE"

#2 CONSTRAINT (EX. ROW)

USFS PROPERTY (HATCHED AREA)

"CLAN CAMPBELL LODE"

ST. LOUIS ADIT (APPROXIMATE CENTERLINE)

"INDEPENDENT LODE"

SOIL LEAD REPOSITORY

SOUTH STACKED REPOSITORY ALTERNATIVE A - PHASE 1

"DENVER LODE"

"BIG STRIKE LODE"

#1 CONSTRAINT (USFS PROPERTY)

SOUTH STACKED REPOSITORY ALTERNATIVE A - PHASE 2

SOUTH STACKED REPOSITORY-A PHASE 3 (3H:1V STACK)

POND 13 REPOSITORY

SITE ACCESS ROAD

#4 CONSTRAINT (LOWER ACCESS ROAD)

UPPER NORTH STAGING/ DRYING FACILITY

#3 CONSTRAINT (INTERIM DRYING FACILITY, FORMER PONDS 16/17)

DOLORES RIVER

"PARCEL A"

9 10 11 12 13 14 15 18

PLAN

SCALE: 1"=200'

N

0 200' 400'

SCALE: 1" = 200'

AECOM
SEPTEMBER 2013
60301339

RICO-ARGENTINE SITE-OU01

SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT

FIGURE 4A - REPOSITORY ALTERNATIVE LOCATIONS WITH SSR-A ALT-A

STACKED SOLID REPOSITORY ALTERNATIVES			
REPOSITORY SITE	PHASE 1	ADDITIONAL PHASES	CUMULATIVE TOTAL
SSR-A ALT-B	±31K CY	±240K CY	±271K CY
NSR	±96K CY	±215K CY	±311K CY
POND 13	±41K CY	N/A	±41K CY
DRYING/STAGING/STOCKPILE FACILITY			
UPPER NORTH	±16K CY (DRYING/STAGING/STOCKPILE ONLY)		

NORTH STACKED REPOSITORY PHASE 1

NORTH STACKED REPOSITORY PHASE 2 (3H:1V STACK)

APPROXIMATE LIMITS OF EXISTING REALM SUBDIVISION RIGHT-OF-WAY

"MARTHA LODE"

"MERVIN LODE"

#2 CONSTRAINT (EX. ROW)

USFS PROPERTY (HATCHED AREA)

"CLAN CAMPBELL LODE"

"INDEPENDENT LODE"

ST. LOUIS ADIT (APPROXIMATE CENTERLINE)

SOIL LEAD REPOSITORY

SOUTH STACKED REPOSITORY ALTERNATIVE B - PHASE 1

"DENVER LODE"

"BIG STRIKE LODE"

#1 CONSTRAINT (USFS PROPERTY)

SOUTH STACKED REPOSITORY ALTERNATIVE B - PHASE 2

SOUTH STACKED REPOSITORY-B PHASE 3 (3H:1V STACK)

POND 13 REPOSITORY

SITE ACCESS ROAD

#4 CONSTRAINT (LOWER ACCESS ROAD)

UPPER NORTH STAGING/ DRYING FACILITY

#3 CONSTRAINT (INTERIM DRYING FACILITY, FORMER PONDS 16/17)

DOLORES RIVER

"PARCEL A"

9 10 11 12 13 14 15 18

PLAN

SCALE: 1"=200'

N

0 200' 400'

SCALE: 1" = 200'

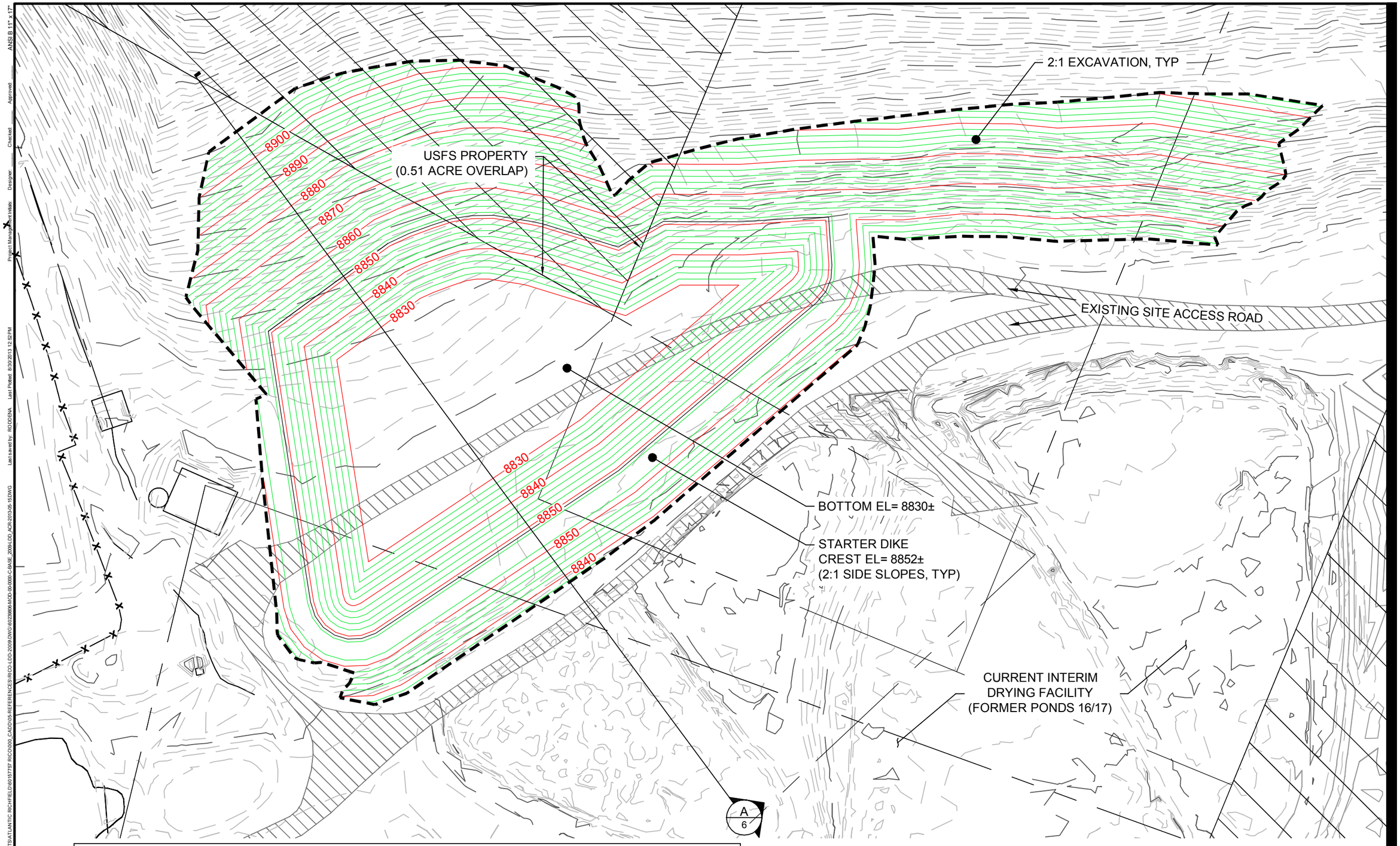
AECOM
SEPTEMBER 2013
60301339

RICO-ARGENTINE SITE-OU01

SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT

FIGURE 4B - REPOSITORY ALTERNATIVE LOCATIONS WITH SSR-A ALT-B

ANSI B 11" x 17"
Approved:
Checked:
Designer:
Project Management Initials:
Last Plotted: 8/30/2013 12:49 PM
Last saved by: RODDENA
Filename: Z:_CURRENT_PROJECTS\ATLANTIC RICHFIELD\60157787 RICO\000_CADD\05 REFERENCES\RICO_LTD-2009.DWG\60329969.MOD-00-0000-C-BASE_2009-LTD_ACR-2013-05-15.DWG



STACKED SOLID REPOSITORY VOLUMES				
REPOSITORY SITE	PHASE 1	ADDITIONAL PHASES*	CUMULATIVE TOTAL	NET BORROW
SSR-A ALT-A	±32K CY	±305K CY	±337K	±51K

*ADDITIONAL PHASES NOT SHOWN

SSR-A-PH1-ALT-A PLAN
SCALE: 1"=60'

N

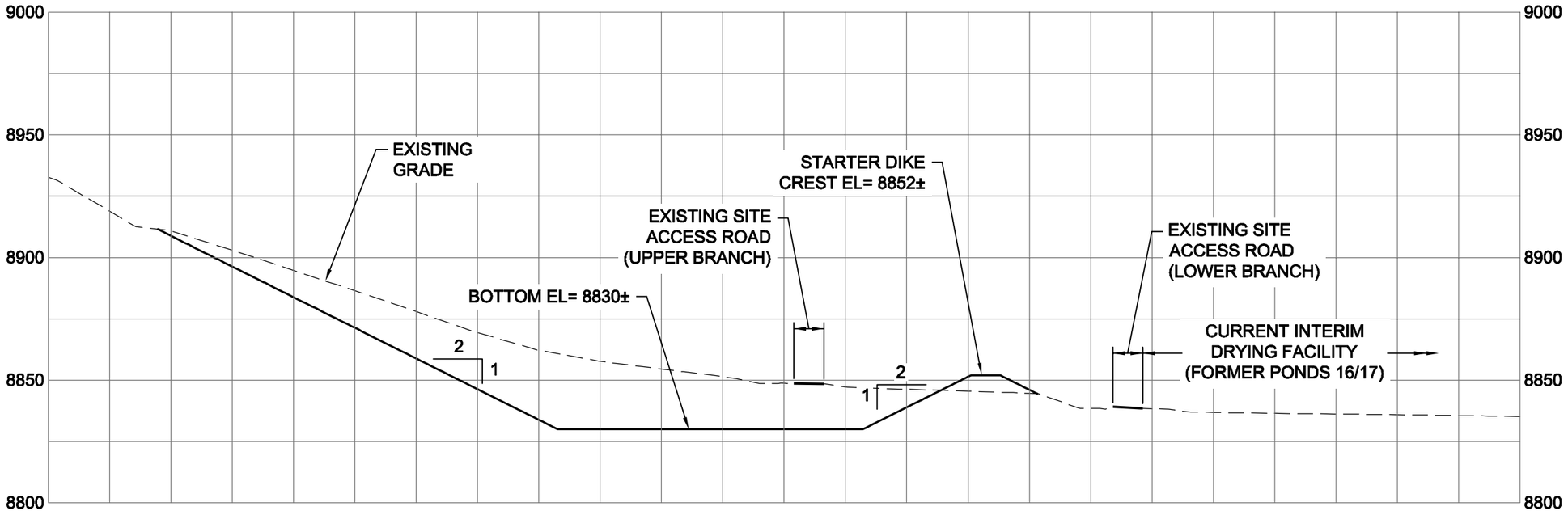
0 60' 120'
SCALE: 1" = 60'

AECOM
SEPTEMBER 2013
60301339

RICO-ARGENTINE SITE-OU01

SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT

FIGURE 5 - SSR-A-PHASE 1 ALTERNATIVE A PLAN



A | **SSR-A-PH1-ALT-A SECTION**

FIG-5 | SCALE: 1"=50'

0 50' 100'

SCALE: 1" = 50'

RICO-ARGENTINE SITE-OU01

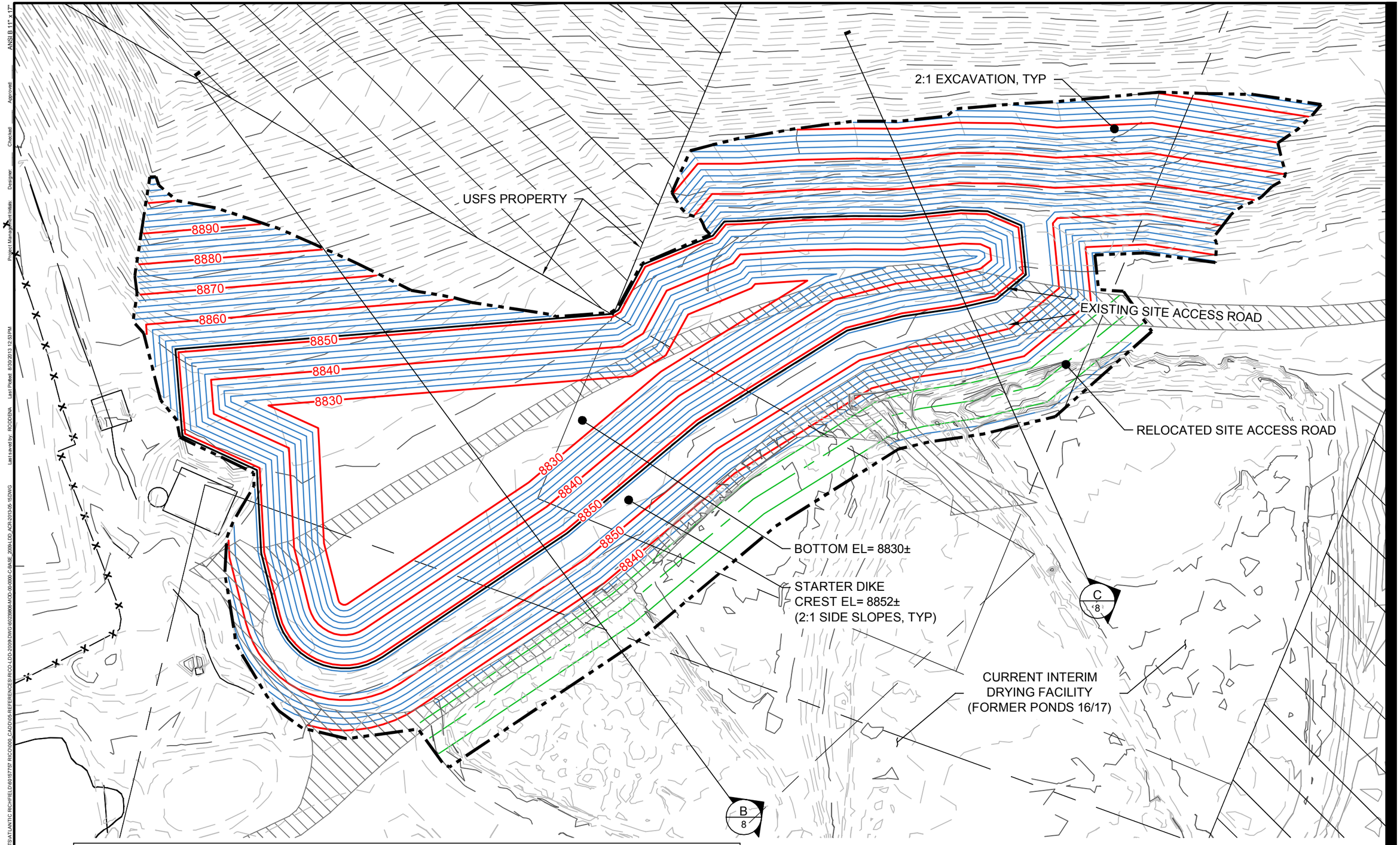
SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT

FIGURE 6 - SSR-A-PHASE 1 ALTERNATIVE A SECTION

AECOM

SEPTEMBER 2013

60301339



STACKED SOLID REPOSITORY VOLUMES				
REPOSITORY SITE	PHASE 1	ADDITIONAL PHASES*	CUMULATIVE TOTAL	NET BORROW
SSR-A ALT-B	±31K CY	±240K CY	±271K	±29K

*ADDITIONAL PHASES NOT SHOWN

SSR-A-PH1-ALT-B PLAN
SCALE: 1"=60'

N

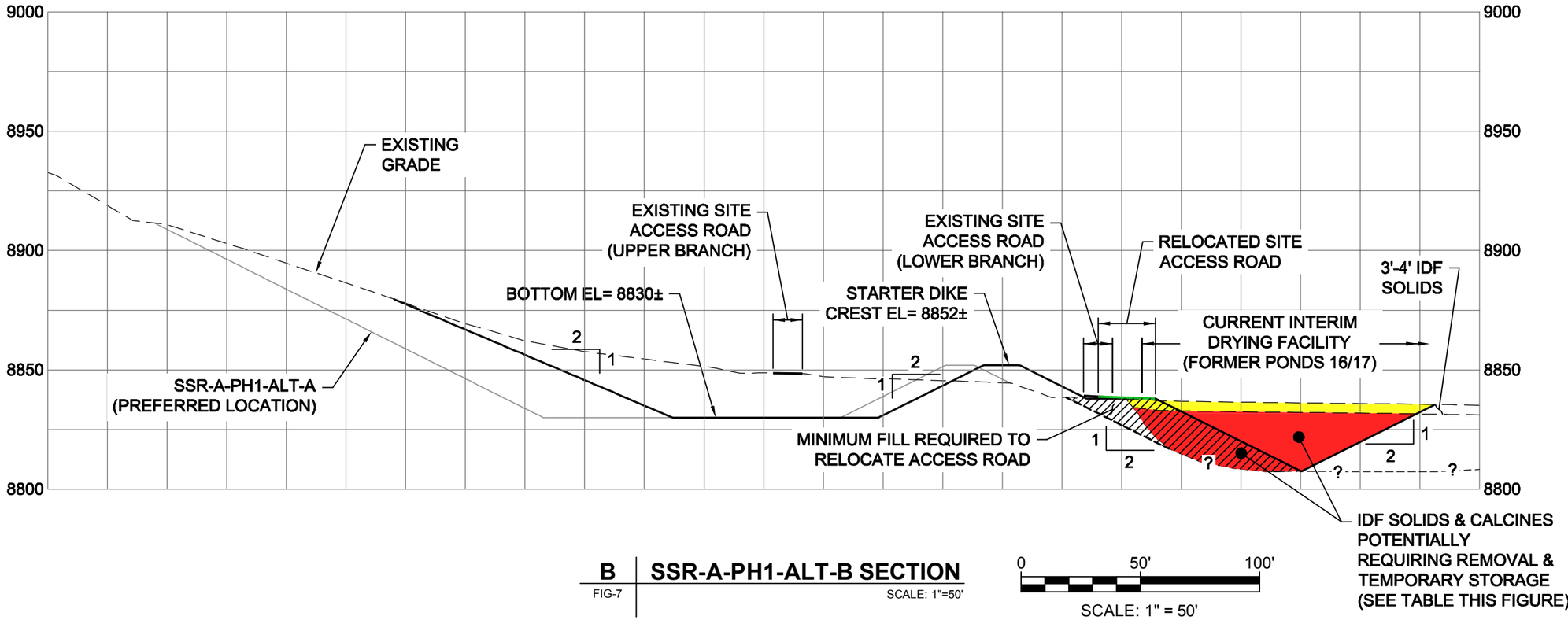
0 60' 120'
SCALE: 1" = 60'

AECOM
SEPTEMBER 2013
60301339

RICO-ARGENTINE SITE-OU01

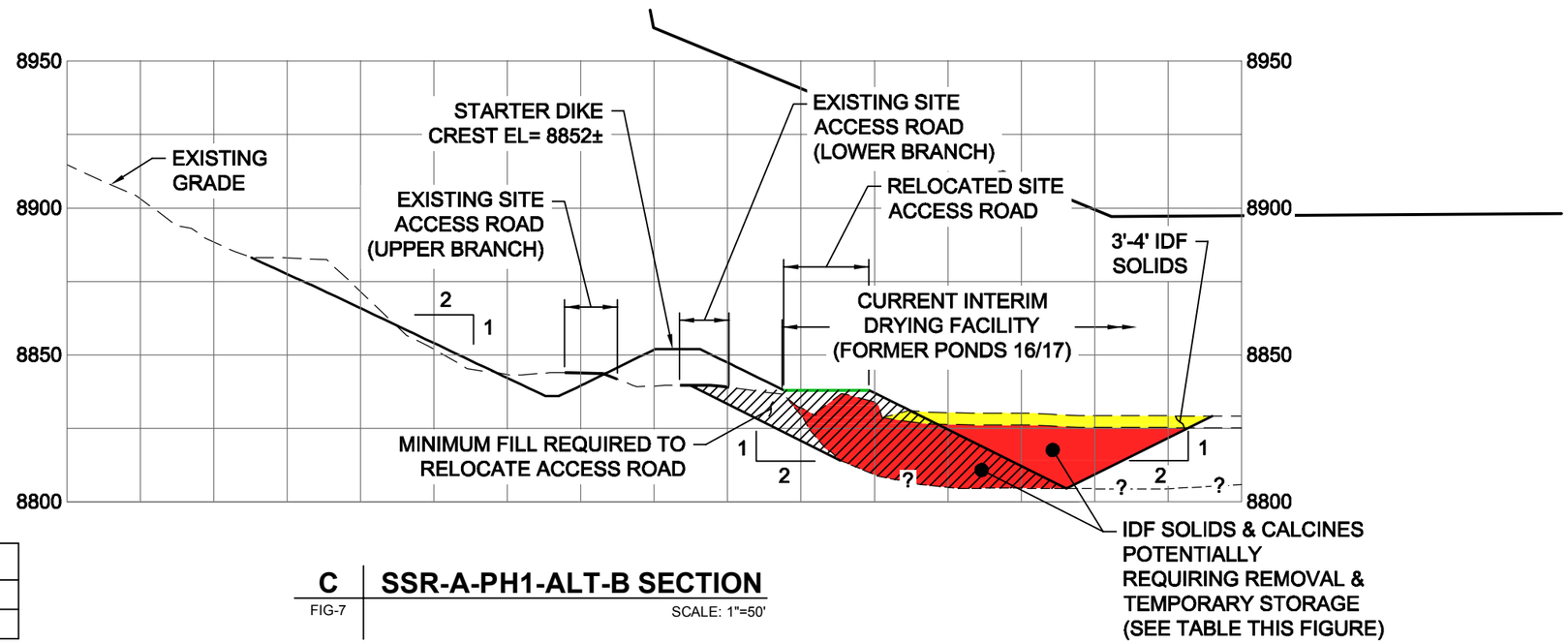
SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT

FIGURE 7 - SSR-A-PHASE 1 ALTERNATIVE B PLAN



B | **SSR-A-PH1-ALT-B SECTION**
FIG-7 SCALE: 1"=50'

0 50' 100'
SCALE: 1" = 50'



C | **SSR-A-PH1-ALT-B SECTION**
FIG-7 SCALE: 1"=50'

ESTIMATED EXCAVATION VOLUMES	
SOLIDS	±6K CY
CALCINES	±25K CY

AECOM
SEPTEMBER 2013
60301339

RICO-ARGENTINE SITE-OU01

SOLIDS REPOSITORY EVALUATION AND PRELIMINARY DESIGN REPORT
FIGURE 8 - SSR-A-PHASE 1 ALTERNATIVE B SECTIONS

ID	Task Name	Duration	Start	Finish
1	**Task C - Design and Construction of Solids Repository**	**1065 days**	**Mon 8/1/11**	**Fri 8/28/15**
2	**Develop Repository Design and Operating Plan**	**740 days**	**Mon 8/1/11**	**Fri 5/30/14**
3	Pre-Design Investigations	566 days	Mon 8/1/11	Mon 9/30/13
4	Alternative Evaluation and Site Selection	65 days	Mon 4/1/13	Fri 6/28/13
5	Prepare Alternative Evaluation and Preliminary Design Report	43 days	Thu 8/1/13	Mon 9/30/13
6	Submit PDR to EPA	1 day	Mon 9/30/13	Mon 9/30/13
7	Prepare Engineering Design and Operations Plan (ED&OP)	54 days	Tue 10/1/13	Fri 12/13/13
8	Prepare Dolores County Land Use Application (DLUA)	54 days	Tue 10/1/13	Fri 12/13/13
9	Submit DLUA and ED&OP to Dolores County	1 day	Fri 12/13/13	Fri 12/13/13
10	Submit ED&OP to EPA	1 day	Fri 12/13/13	Fri 12/13/13
11	CDPHE completeness review of ED&OP	25 days	Mon 12/16/13	Fri 1/17/14
12	CDPHE Technical Review and Public Hearing/Comments	90 days	Mon 1/20/14	Fri 5/23/14
13	CDPHE Recommendation to Dolores County	1 day	Fri 5/23/14	Fri 5/23/14
14	Dolores County Issuance of Certificate of Designation	1 day	Fri 5/30/14	Fri 5/30/14
15	**Solids Repository Construction and Solids Placement**	**310 days**	**Mon 6/23/14**	**Fri 8/28/15**
16	Mobilization	6 days	Mon 6/23/14	Mon 6/30/14
17	Construct Phase 1 Repository	89 days	Tue 7/1/14	Fri 10/31/14
18	Initial Placement of Dried Pond Solids	20 days	Mon 11/3/14	Fri 11/28/14
19	Placement of Downstream Pond Solids	65 days	Mon 6/1/15	Fri 8/28/15

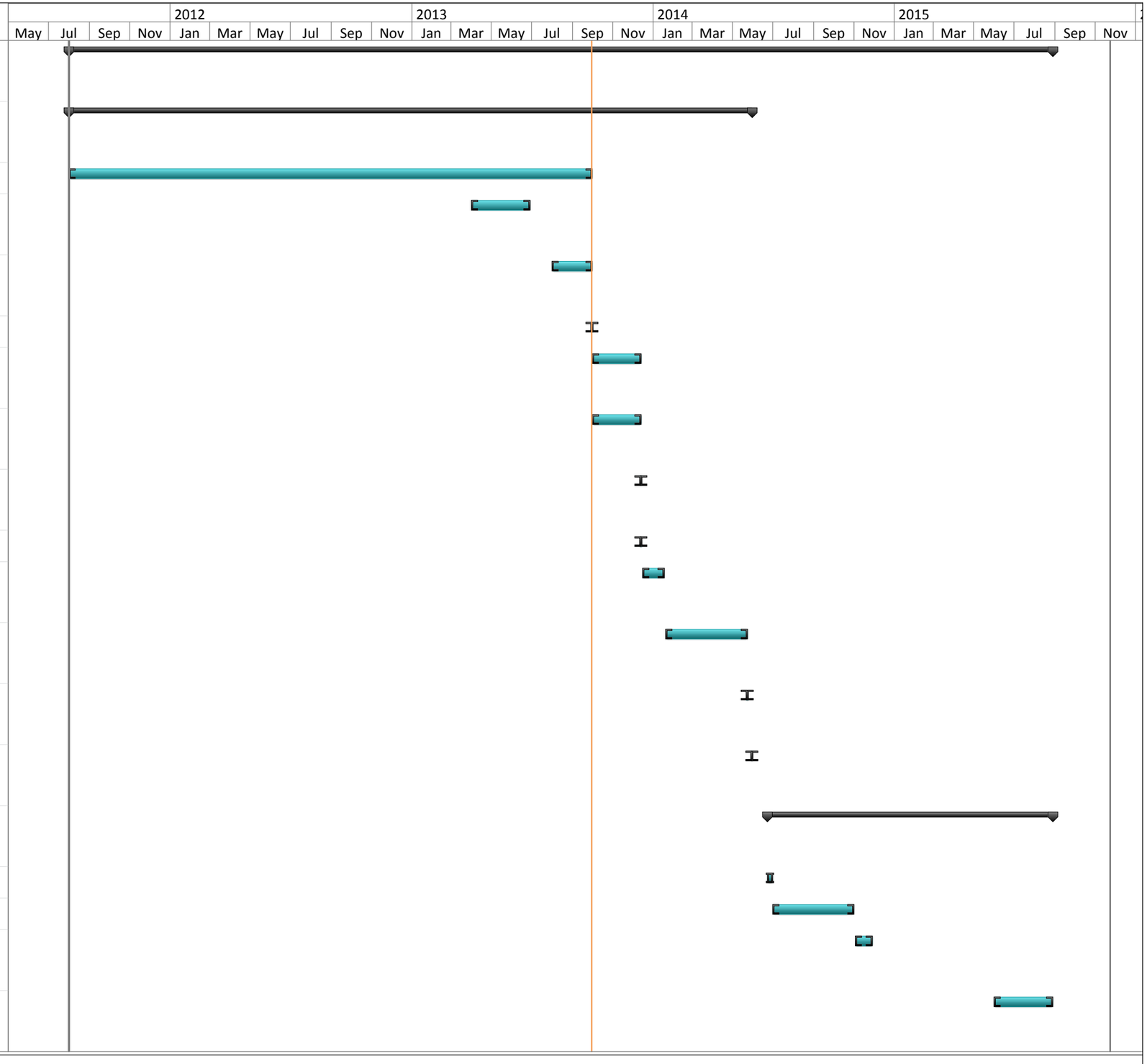


Figure 9 - Schedule

Appendix A

Geotechnical Investigation Logs

Boring and Monitoring Well Logs

AECOM

CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **ADF/R1**
PROJECT NAME: **Rico-Argentine Site - OU01**	ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,843.9 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL
	1	SS			FILL - Silty GRAVEL (GM) - moist - grayish - angular rock fragments
		PA			*NOTE: Laydown yard has been reworked with excavating equipment
5.0					
5.5	2	SS			
6.0					FILL - Silty SAND (SM), fine to medium - extremely dense - moist
		PA			>60 blows 6-12" at 5.5'
9.0					FILL - Silty GRAVEL (GM), mostly pebble gravel - moist - grayish - angular rock fragments - grades tan, brown
10.0	3	SS			FILL - Mine spent ore - well graded sand sized (SW) - medium dense - dry - burgundy and white
11.5					FILL - Calcines - sand and silt sized (SM) - moist
		PA			
14.0					FILL - Spent ore - well graded SAND (SW) - medium dense - moist - burgundy and trace white
15.0	4	SS			
16.0					FILL: Calcines - sand and silt sized (SM) - wet
		PA			
18.5					FILL - Silty GRAVEL (GM), Cobbles - moist - light brown with 4.0" layer stained yellow
20.0					
	5	SS			FILL - Calcine tailings - sand and silt sized (GM) - extremely dense - wet
		PA			
23.5					ALLUVIUM - Silty GRAVEL (GM) - angular to subrounded cobbles up to 5" diameter - extremely dense - wet - flowing 25.0'-27.0' then increasing clay down to 30.0' - wet at 30.0' but not flowing
25.0	6	SS			
		PA			
30.0					
30.0					
31.0	7	SS			ALLUVIUM - Silty GRAVEL (GM) - angular to subrounded cobbles up to 5" diameter - wet - increasing clay down to 31.0' - wet at 31.0' but not flowing (GM)
31.0					End of Boring
					Boring logged by: L. Beem
					Casing: 7.0" I.D. Sonic

UNIT DRY WT LBS /FT³

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

75

16

12

>100/12"

>80/12"

>60/12"

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1389466**	BORING STARTED: **10/2/11**	AECOM OFFICE: **Denver**		
EASTING: **2267869**	BORING COMPLETED: **10/2/11**	ENTERED BY: **SJH**	SHEET NO: **1** OF: **1**	
WL: **21.0' WD**	RIG/FOREMAN: **SONIC C600/**	APP'D BY: **EED**	AECOM JOB NO: **60157757**	

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **ADF/R2**
PROJECT NAME: **Rico-Argentine Site - OU01**	ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,842 7 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL
	1	SS			FILL - Silty GRAVEL (GM), pea gravel size and stained - moist - black
					1.5
					2.0 FILL - Sandy SILT (SM), coarse sand size fragments of hermosa - moist - black with red
		PA			FILL - Silty CLAY (CL/CH) with some Pebble-Cobble fragments and Gravel - moist - brown - liner in core at 3.0', rubber
5.0					4.5
	2	SS			FILL - Calcines (SM) 4.5-7.5' - calcines increasing clay with depth trace fine gravel - extremely dense
					7.5
		PA			FILL - WOOD debris mixed with Silt and trace Clay - decomposition odor
					9.0
					9.5 FILL - Well graded SAND (SW), medium to coarse - wet to saturated
10.0					10.0
	3	SS			FILL - Silty GRAVEL (GM) - angular gravel - extremely dense - saturated
					FILL - Silty GRAVEL (GM), trace Clay, increasing Clay down - angular and subrounded cobble up to 7" in diameter - wet
		PA			14.5
15.0					FILL - Well graded GRAVEL (GW), with fine to coarse Sand - angular and subrounded 1-2" minus - dense - saturated - wire and piece of timber
	4	SS			17.0
					ALLUVIUM - Silty GRAVEL (GM) with trace Clay - mostly subrounded cobbles up to 5" in diameter - extremely dense - wet not saturated
		PA			
20.0					20.5
	5	SS			Well graded GRAVEL (GM) with fine to coarse Sand - subrounded cobbles up to 6" diameter- saturated
25.0					Increasing Silt to 28.0'
		PA			
					28.0
					Silty GRAVEL (GM) with fine to coarse Sand - angular and subrounded cobbles up to 5" diameter - wet
30.0					30.0
					End of Boring Backfilled with bentonite chips to gravel surface (8 bags) Hole caved below 20.0' Boring logged by: L. Beem Casing: 7.0" I.D. Sonic

UNIT DRY WT LBS /FT 3

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.2
1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %
10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT)
10 20 30 40 50

58/12
>50/6"
35
>50/6"
>50/6"

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1389765**	BORING STARTED: **10/2/11**	AECOM OFFICE: **Denver**		
EASTING: **2267877**	BORING COMPLETED: **10/2/11**	ENTERED BY: **SJH**	SHEET NO: **1** OF **1**	
WL: **7.0' WD**	RIG/FOREMAN: **SONIC C600/**	APP'D BY: **EED**	AECOM JOB NO: **60157757**	

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

ANDERSON Engineering Company, Inc.
975 West 2100 South, Suite 100
Salt Lake City, Utah 84119
BUS (801) 972-6222
FAX (801) 972-6235

SAMPLING METHOD: BACKHOE PIT

LOGGED BY: JOEL MARTINEAU

ARCO

RICO RECLAMATION

BORROW MATERIAL

BORING NO. APB-1

SHEET 1 OF 1

DATE STARTED: 10 APR '96

DATE COMPLETE: 10 APR '96

TOTAL DEPTH: 3.0

SURFACE ELEV: 8895

N: 26680 E: 20135

SAMPLE NO.	SAMPLE DEPTH (ft)	DEPTH (ft)	SYMBOL	USC	DESCRIPTION
APB-1	0-3'	0		SC-CL OH-GW	SURFACE HAS ROCKS EXPOSED 0-0.7 Root ZONE Soil GRAYish BROWN SANDY-clay to clay w/ ORGANIC MATERIAL AND MINOR GRAVEL TO 1CM SIZE. Some Large Rock Sizes, scattered. 0.7-3.0 FT BROWN Soil w/ ISolated Sub-rounded rock Texture SC-CL EST 5% Rock > 3". Rock Fragments To 4 CM, Subangular.
		1			
		2			
		3			

ANDERSON Engineering Company, Inc.
975 West 2100 South, Suite 100
Salt Lake City, Utah 84119
BUS (801) 972-6222
FAX (801) 972-6235

SAMPLING METHOD: BACKHOE

LOGGED BY: J. MARTINEAU

ARCO

RICO RECLAMATION

BORROW MATERIAL

BORING NO. APB-2

SHEET / OF 1

DATE STARTED: 10 APR 1996

DATE COMPLETE: 10 APR 1996

TOTAL DEPTH: 3.0'

SURFACE ELEV: 8853

N 26710 E 19940

SAMPLE NO.	SAMPLE DEPTH (ft)	DEPTH (ft)	SYMBOL	USC	DESCRIPTION
APB-2	0-3'	0		SM-CL + GW	0-1.0' Root Zone No Noticable Organics Color Reddish-Brown to Yellow-Brown. (Limonitic + Hematitic) Fines Sandy Silt and Clay Rocks Mostly Sub-angular
		1		SM-CL + GW	1.0' – 3.0' Similar to above Larger Rock increasing Percentage Largest Size 1.5 x 1.2 x 1.7 Two others over 1' Screen Size
		2			
		3			

ANDERSON Engineering Company, Inc.
975 West 2100 South, Suite 100
Salt Lake City, Utah 84119
BUS (801) 972-8222
FAX (801) 972-8235

SAMPLING METHOD: Backhoe

LOGGED BY: J. MARTINEAU

ARCO

RICO RECLAMATION

BORROW MATERIAL

BORING NO. APB-3
SHEET 1 OF 1
DATE STARTED: 10 APR 96
DATE COMPLETE: 10 APR 96
TOTAL DEPTH: 3'
SURFACE ELEV: 8836
N 26900 E 20000

SAMPLE NO.	SAMPLE DEPTH (ft)	DEPTH (ft)	SYMBOL	USC	DESCRIPTION
APB-3	0-3'	0		GW-SC-CL	NO NOTICABLE ORGANIC HORIZON BROWN Soil-Rock Mixture Subangular Rock consistent gradation From Top to Bottom. (GROUND FROZEN TO 2.5 Ft) BOTTOM 3' WATER
		1			
		2			
		3			

ANDERSON Engineering Company, Inc.
975 West 2100 South, Suite 100
Salt Lake City, Utah 84119
BUS (801) 972-6222
FAX (801) 972-8235

SAMPLING METHOD: BACKHOE
VISUAL ONLY

LOGGED BY: J MARTINEAU

ARCO

RICO RECLAMATION

BORROW MATERIAL

BORING NO. APB-4
SHEET 1 OF 1
DATE STARTED: 10 APR 96
DATE COMPLETE: 10 APR 96
TOTAL DEPTH: 3.0 ft
SURFACE ELEV: 8828
X: E 19870 Y: N 26475

SAMPLE NO.	SAMPLE DEPTH (ft)	DEPTH (ft)	SYMBOL	USC	DESCRIPTION
NONE TAKEN VISUAL ONLY	N/A	0		GW-GP	Water level - sits in River-Gravels Mostly SAND & gravel. No soil horizons Fines about 45-50% 3-12" Rock 45% >12" 3-5% This Material consists mostly of Rounded Rock & River Gravel, SANDY FINES
		1			
		2			
		3			

BORING B-1

SURFACE ELEVATION 8833

COORDINATES

OTHER TESTS	STRENGTH TEST RESULTS			% PASSING NO. 200 SIEVE	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			SAMPLING	
	TYPE OF TEST	CONFINING PRESSURE (psf)	PEAK SHEAR STRENGTH (psf)				LL (%)	PL (%)	PI (%)	BLOW COUNT	SAMPLE TYPE
										18	SPT
										9	SPT
										7	SPT
				14						13	SPT
										28	D
										21	SPT
										50/5"	SPT

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70

SAMPLING

SYMBOLS

DESCRIPTION

FILL

BROWN FINE TO COARSE SANDY GRAVEL WITH SILT MEDIUM DENSE

GRADES WITH LENSES OF SILTY SAND AND SANDY SILT

COLORS GREY AND GRADES WITH SOME CLAY GRADES LOOSE TO MEDIUM DENSE

GRADES LOOSE

GRADES WITH MORE GRAVEL AND MEDIUM DENSE

DARK BROWN TO BLACK SILTY GRAVEL WITH SAND, MEDIUM DENSE

BROWN SILTY FINE TO COARSE SAND WITH SOME GRAVEL MEDIUM DENSE

BROWN SANDY GRAVEL, DENSE TO VERY DENSE
AUGER REFUSAL AT 33 FEET
BORING COMPLETED AT 33.5 FEET ON 6/3/81
WATER ENCOUNTERED AT 27.8 FEET ON 6/3/81

KEY

- ■ INDICATES UNDISTURBED SAMPLE
- ⊠ INDICATES DISTURBED SAMPLE
- □ INDICATES SAMPLING ATTEMPT WITH NO RECOVERY
- ◪ INDICATES STANDARD PENETRATION TEST SAMPLE
- P - IN BLOW COUNT COLUMN INDICATES SAMPLER HYDRAULICALLY PUSHED

SAMPLE TYPE

- U - DAMES & MOORE "U" BIT
- T - DAMES & MOORE THIN-WALL
- P - DAMES & MOORE PISTON
- SPT - STANDARD SPLIT-SPOON
- D - DAMES & MOORE "D" SAMPLER

NOTE:

1. THE SOIL CONDITIONS ARE DESCRIBED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM, PLATE A-3.
2. BLOW COUNT HAS BEEN TAKEN AS THE NUMBER OF BLOWS REQUIRED TO DRIVE A SAMPLER TO ONE-FOOT PENETRATION USING A 140 POUND WEIGHT FALLING 30 INCHES.

LOG OF BORING

DAMES & MOORE

PLATE A-1A

FILE ANACONDA RIO 04010-082-1608

FILE ANACONDA RICO 04010-002-1605

BORING B-2

SURFACE ELEVATION 8834

COORDINATES

OTHER TESTS	STRENGTH TEST RESULTS: TYPE OF TEST	CONFINING PRESSURE (psf)	PEAK SHEAR STRENGTH (psf)	% PASSING NO. 200 SIEVE	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LL (%)	PL (%)	PI (%)	SAMPLING: BLOW COUNT	SAMPLE TYPE	DEPTH IN FEET	SAMPLING	SYMBOLS	DESCRIPTION
										26	SPT	0		SC	BROWN CLAYEY SAND WITH GRAVEL MEDIUM DENSE
												5		SM	BROWN AND GREY GRAVELLY SAND WITH SOME CLAY
GRADATION				22			32	17	15	8	SPT	10		SC	YELLOW AND BROWN FINE TO COARSE CLAYEY SAND WITH GRAVEL LOOSE
										12	SPT	15			LUMBER FRAGMENTS AT 15 FEET GRADES MEDIUM DENSE
										21	SPT	20		GC	GREY & BROWN SANDY GRAVEL WITH SOME SILT MEDIUM DENSE
						67	67	51	16	5	SPT	25			DARK BROWN AND BLACK FINE SANDY SILT SOFT TO MEDIUM STIFF
						66				11	SPT				
										50 for 1/4"	SPT	30			AUGER REFUSAL AT 30.5 FEET
												35			BORING COMPLETED AT 30.5 FEET ON 6/4/81
												40			WATER ENCOUNTERED AT 20.7 FEET ON 6/3/81
												45			
												50			
												55			
												60			
												65			
												70			

FILL

KEY

- ■ INDICATES UNDISTURBED SAMPLE
- ⊠ INDICATES DISTURBED SAMPLE
- □ INDICATES SAMPLING ATTEMPT WITH NO RECOVERY
- ◪ INDICATES STANDARD PENETRATION TEST SAMPLE
- P - IN BLOW COUNT COLUMN INDICATES SAMPLER HYDRAULICALLY PUSHED

SAMPLE TYPE

- U - DAMES & MOORE "U" BIT
- T - DAMES & MOORE THIN-WALL
- P - DAMES & MOORE PISTON
- SPT - STANDARD SPLIT-SPOON
- D - DAMES & MOORE "D" SAMPLER

NOTE:

SEE PLATE A - 1A.

LOG OF BORING

DAMES & MOORE

PLATE A-1B

BORING B-3

SURFACE ELEVATION 8836
COORDINATES

OTHER TESTS	STRENGTH TEST RESULTS			% PASSING NO. 200 SIEVE	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			SAMPLING	
	TYPE OF TEST	CONFINING PRESSURE (psf)	PEAK SHEAR STRENGTH (psf)				LL (%)	PL (%)	PI (%)	BLOW COUNT	SAMPLE TYPE
				42						6	SPT
										32	SPT
										7	SPT
										23	SPT

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30

SAMPLING

SYMBOLS | DESCRIPTION

- BROWN SANDY CLAYEY GRAVEL WITH SAND LOOSE
- SAMPLER DRIVEN THROUGH COBBLE
- GRADES MEDIUM DENSE
- AUGER REFUSAL AT 20'
  BORING COMPLETED AT 20 FEET
  ON 6/5/81
  NO WATER ENCOUNTERED

FILL

BORING B-4

SURFACE ELEVATION 8835
COORDINATES

OTHER TESTS	STRENGTH TEST RESULTS			% PASSING NO. 200 SIEVE	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			SAMPLING	
	TYPE OF TEST	CONFINING PRESSURE (psf)	PEAK SHEAR STRENGTH (psf)				LL (%)	PL (%)	PI (%)	BLOW COUNT	SAMPLE TYPE
										8	SPT
GRADATION				22		15	27	21	6	5	SPT
										1	SPT

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30

SAMPLING

SYMBOLS | DESCRIPTION

- BROWN CLAYEY SAND AND GRAVEL WITH COBBLES LOOSE
- SC-GC
- DARK BROWN SILTY AND SANDY CLAY WITH ORGANIC MATERIAL
- CL
- AUGER REFUSAL AT 24.5 FEET
  BORING COMPLETED AT 24.5 FEET
  ON 6/5/81
  NO WATER ENCOUNTERED

FILL

KEY

- ■ INDICATES UNDISTURBED SAMPLE
- ⊠ INDICATES DISTURBED SAMPLE
- □ INDICATES SAMPLING ATTEMPT WITH NO RECOVERY
- ◪ INDICATES STANDARD PENETRATION TEST SAMPLE
- P - IN BLOW COUNT COLUMN INDICATES SAMPLER HYDRAULICALLY PUSHED

SAMPLE TYPE

- U - DAMES & MOORE "U" BIT
- T - DAMES & MOORE THIN-WALL
- P - DAMES & MOORE PISTON
- SPT - STANDARD SPLIT-SPOON
- D - DAMES & MOORE "D" SAMPLER

NOTE:
SEE PLATE A - 1A.

LOG OF BORING

DAMES & MOORE

PLATE A-1C

FILE ANACONDA RICO 04010-082-1005

BORING B-5

SURFACE ELEVATION 8839
COORDINATES

OTHER TESTS	STRENGTH TEST RESULTS: TYPE OF TEST	CONFINING PRESSURE (psf)	PEAK SHEAR STRENGTH (psf)	% PASSING NO. 200 SIEVE	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LL (%)	PL (%)	PI (%)	SAMPLING: BLOW COUNT	SAMPLE TYPE
pH, SULFATES						5	31	20	11	11	SPT
										11	SPT
										32	SPT
				43						11	SPT
						13	44	23	21	38	SPT
										50 for 4 1/2"	SPT

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30, 35

SAMPLING

SYMBOLS / DESCRIPTION

- 0–15: BROWN SANDY CLAY WITH SOME GRAVEL STIFF (CL)
- GRADES WITH MORE GRAVEL
- 20–25: YELLOW-BROWN GRAVELLY SAND WITH SOME CLAY AND WOOD FRAGMENTS LOOSE TO MEDIUM DENSE (SM)
- 25–30: DARK BROWN SANDY CLAY (CL)
- AUGER REFUSAL AT 29.5 FEET
  WEATHERED SANDSTONE BEDROCK
  BORING COMPLETED AT 30.25 FEET ON 6/6/81
  WATER ENCOUNTERED AT 25.5 FEET ON 6/6/81

FILL

BORING B-6

SURFACE ELEVATION 8793
COORDINATES

OTHER TESTS	STRENGTH TEST RESULTS: TYPE OF TEST	CONFINING PRESSURE (psf)	PEAK SHEAR STRENGTH (psf)	% PASSING NO. 200 SIEVE	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LL (%)	PL (%)	PI (%)	SAMPLING: BLOW COUNT	SAMPLE TYPE
										2/4"	SPT
				25			28	19	7	5	SPT
										50/0"	SPT

DEPTH IN FEET: 0, 5, 10, 15, 20, 25

SAMPLING

SYMBOLS / DESCRIPTION

- 0–5: DARK BROWN SILTY SAND WITH GRAVEL AND COBBLES MEDIUM DENSE
- 0–10: DARK BROWN CLAYEY SILT AND SILTY CLAY WITH GRAVEL AND COBBLES MEDIUM STIFF (CL, ML)
- AUGER REFUSAL AT 10 FEET
  BORING COMPLETED AT 11 FEET ON 6/7/81
  WATER ENCOUNTERED AT 5 FEET ON 6/7/81

KEY

- ■ INDICATES UNDISTURBED SAMPLE
- ⊠ INDICATES DISTURBED SAMPLE
- □ INDICATES SAMPLING ATTEMPT WITH NO RECOVERY
- ☑ INDICATES STANDARD PENETRATION TEST SAMPLE
- P - IN BLOW COUNT COLUMN INDICATES SAMPLER HYDRAULICALLY PUSHED

SAMPLE TYPE

- U - DAMES & MOORE "U" BIT
- T - DAMES & MOORE THIN-WALL
- P - DAMES & MOORE PISTON
- SPT - STANDARD SPLIT-SPOON
- D - DAMES & MOORE "D" SAMPLER

NOTE:
SEE PLATE A - 1A.

LOG OF BORING

DAMES & MOORE

PLATE A-1D

FILE ANACONDA PRJ 04010-062-1605

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME: Rico Ponds PROJECT NO.:	BORING NUMBER: DH-3	COORDINATES OR LOCATION:
LOGGED BY: K. Casper CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH (ENCOUNTERED) GWL DEPTH (STATIC)
DRILLING METHOD: HSA	HOLE DIAMETER:	FLUID USED: NA
DATE STARTED: 10/9/08 DATE COMPLETED:		
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA	FROM ____ A.G.S TO ____ B.G.S. FROM ____ TO ____ B.G.S.	

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
1						Red silty sand with gravel Calcite tailings	
2							
3							
4							
5							
6		X	6 4 4	10%			
7							
8							
9							
10							
11		|				No recovery, Shelby pushed 24" then free fell another 12". Drilled into void. Bottom of auger at 10'. Tape measured to 16'. Used mirror to look into boring. Cavity opens to the South. Moving rig to another location ~ 30' to the west.
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

NOTES

TD= 10'

Driller thought we hit the void at ~ 8'.

ANDERSON

BORING LOG

PAGE 1 OF 2

PROJECT NAME: Rico Ponds PROJECT NO.:	BORING NUMBER: DH-3R	COORDINATES OR LOCATION: /
LOGGED BY: K-Cosper CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH (ENCOUNTERED) 24 GWL DEPTH (STATIC) NA
DRILLING METHOD: HSA	HOLE DIAMETER:	FLUID USED: NA
		DATE STARTED: 10/9/08 DATE COMPLETED:
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA		FROM ____ A.G.S TO ____ B.G.S. FROM ____ TO ____ B.G.S.

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
1–10						Silty sand and gravel, Brown,	
11–13		I		75%		piece of pipe and Rock (oxidized) in tip of shelby.	
14–15						Sandy Silt with clay Brown moist	
16–17		X	3 2 2			oxidized (red/orange/yellow) Sand with some silt & fine gravel. Moist	
18–20							
21–22		I		60%			
23–24						Lt Brown wet sandy Silt. Water	
25–26		X	10 10 10	50%		Saturated coarse sand, Gray	
27–30						Saturated Coarse sand and gravel; Gray/Brown	
31–32		X	10 10 13	50%			

TD= _____

NOTES

20' Shelby - Rock at bottom; Completely Sealed end.

ANDERSON

BORING LOG

PAGE 2 OF 2

PROJECT NAME: PROJECT NO.:	BORING NUMBER: DH-3R	COORDINATES OR LOCATION: /
LOGGED BY: CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH (ENCOUNTERED) GWL DEPTH (STATIC)
DRILLING METHOD:	HOLE DIAMETER: / FLUID USED:	DATE STARTED: DATE COMPLETED:
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE:		FROM _____ A.G.S TO _____ B.G.S. FROM _____ TO _____ B.G.S.

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
33							
34							
35							
36		X	17				
37			17				
38			14				

NOTES

TD= 35

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME: Rico Ponds PROJECT NO.:	BORING NUMBER: D14-4	COORDINATES OR LOCATION:	
LOGGED BY: K. Cosper CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH (ENCOUNTERED) 11 GWL DEPTH (STATIC) NA	
DRILLING METHOD: HSA	HOLE DIAMETER:	FLUID USED: NA	DATE STARTED: 10/7/08 DATE COMPLETED:
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA		FROM ____ A.G.S TO ____ B.G.S. FROM ____ TO ____ B.G.S.	

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
1						Silty sand + gravel	
2							
3						Red silty gravel - caliche ?	
4							
5						Silty sand w/ gravel	
6		X	8			minor clay	
7			7				
8			5				
9						Black silt with clay	
10						Clayey gravel	
11		X	4		—	Water —	
12			3				
13			2			Silty gravel w/ clay	
14							
15							
16		X	0			saturated Gray / dk Brown	
17			4			Silty, Clay	
18			8				
19						Saturated silt - Dk. Brown	
20						Flowing.	
		X	50/4"	30%		silty sand and gravel	
						dk. brown	

NOTES

TD= 20.5

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME: RICO PONDS PROJECT NO.:	BORING NUMBER: DH-11	COORDINATES OR LOCATION:
LOGGED BY: K. COSPER CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH (ENCOUNTERED) ~20 GWL DEPTH (STATIC) NA
DRILLING METHOD: HSA	HOLE DIAMETER:	FLUID USED: NA
		DATE STARTED: 10/8/08 DATE COMPLETED:
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA		FROM ____ A.G.S TO ____ B.G.S. FROM ____ TO ____ B.G.S.

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
1–4						Brown clayey silt, moist Minor gravel	
5–16						Red silty sand. Calcine tailings	
17–20						Red silt - calcine tailings	
21–22		X	27 50/1"			Sand + gravel, saturated red/brown w/ Cobbles Refusal @ 21'	

TD= 21

NOTES: Attempted Shelby @ 10' but sample pulled out - 0 Recovery

ANDERSON

BORING LOG

PAGE 1 OF 2

PROJECT NAME: Rico Ponds PROJECT NO.:	BORING NUMBER: DH-12R	COORDINATES OR LOCATION:
LOGGED BY: K. Casper CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH (ENCOUNTERED) 43' GWL DEPTH (STATIC) NA
DRILLING METHOD: ODEX	HOLE DIAMETER:	FLUID USED: AIR
DATE STARTED: 10/13/08 DATE COMPLETED:		
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA	FROM ____ A.G.S TO ____ B.G.S. FROM ____ TO ____ B.G.S.	

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
1						Brown Sandy Silt with some clay and gravel	
2							
3							
4							
5							
6						Brown clayey silt with some sand and small gravel	
7							
8							
9							
10						Rock	
11							
12						Red silty sand with gravel (Caliche)	
13							
14		X	4/5/5			Brown Sandy Silt with some clay and gravel	
15							
16							
17							
18							
19							
20							
21							
22							
23						Brown Sandy Silt with Gravel	
24							
25							
26							
27							
28							
29							
30							
31							
32							

NOTES

TD= ____

ANDERSON

BORING LOG

PAGE 2 OF 2

PROJECT NAME: PROJECT NO.:	BORING NUMBER: DH-12R	COORDINATES OR LOCATION:
LOGGED BY: CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH (ENCOUNTERED) 43 GWL DEPTH (STATIC) NA
DRILLING METHOD: ODEX	HOLE DIAMETER:	FLUID USED: AIR
DATE STARTED: DATE COMPLETED:		
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA	FROM ____ A.G.S TO ____ B.G.S. FROM ____ TO ____ B.G.S.	

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
33							
34						Sandy silt and gravel, minor clay	
35							
36							
37							
38						Rock - [illegible]	
39							
40						Sandy silt and gravel minor clay	
41							
42						Red rock with some silt & sand	
43							
44						gravel with some silt	Water @ 43'
45							
46						Silty gravel	
47							
48						clayey silt w/ minor gravel moist - wet	out of water @ 48'
49							
50							
51						Sandy gravel with some silt, moist	
52							
53							
54						harder drilling	
55						TD ↑	

TD= 55'

NOTES

Some gravel is crushed rock from ODEX hammer bit. Unknown original size.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
St. Louis Ponds Area, Rico, Colorado	AARCOE0105.00	EB-1

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jeff Pennell Layne-Western	11/15/2004	11/18/2004	hsa/odex

WI Unique Well No.	DNR Well ID No	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		EB-1	8,820.9 Feet Site	8,837.9 Feet Site	8.0 inches

Local Grid Origin ☒ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NW 1/4 of Section 25, T 40 N, R 10 W
Lat ° ' "
Long ° ' "
Local Grid Location ☒ N ☒ E
1388792 Feet ☐ S 2267917 Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
			Rico, Colorado

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
1 SS	24	29-44 18-14	0	FILL: Gray, very dense, WASTE ROCK, igneous cobbles					62					Note: Compressive Strength = SPT N value
2 SS	24	5-8 8-12	2	FILL ("Calcine Tailings"): Purple-maroon to gray, loose to medium dense, fine to very fine grained, SILTY SAND, rare gravel					16					
3 SS	24	4-9 8-11	4						17					Note: Length att. on split spoon = 24"
4 SS	24	5-5 7-7	6						12					
1 SH	24		8											
2 SH	24		10											
4 SS	24	5-4 4-3	12		SM				8					
3 SH	24		14											
5 SS	24	2-2 6-16	16						8					
4 SH	24		18											
6 SS	24	12-7 9-7	20						16					
5 SH	24		22											
			24		GP									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Darrell R. Reed

Firm: **SEH Inc** 421 Frenette Drive, Chippewa Falls, WI 54729, www.sehinc.com

Tel: 715.720.6200
Fax: 715.720.6300

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number EB-1 Use only as an attachment to Form 4400-122.

Sample									Soil Properties						
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
7 SS	24	22-20 24-50	26 28 30 32	Brown, dense, fine to coarse GRAVEL (alluvium), much fine to coarse grained sand.	GP				44					
				End of boring at 33' (refusal)										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
St. Louis Ponds Area, Rico, Colorado	AARCOE0105.00	EB-2

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jeff Pennell Layne-Western	11/19/2004	11/19/2004	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		EB-2	8,818.8 Feet Site	8,826.8 Feet Site	8.0 inches

Local Grid Origin ☒ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NW 1/4 of Section 25, T 40 N, R 10 W
Lat ° ' "
Long ° ' "
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
			Rico, Colorado

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				FILL: Gray, very dense, WASTE ROCK, igneous cobbles										
1 SS	24	4-6 4-7	2	FILL("Calcine Failings"): Purple-maroon to gray, loose to medium dense, fine to very fine grained, SILTY SAND, rare gravel					10					Note: Compressive Strength = SPT N value Note: Length att. on split spoon = 24"
2 SS	24	4-4 5-4	4						9					
3 SS	24	3-3 6-3	6						9					
4 SS	24	3-2 1-1	8		SM				3					
			10											
			12											
5 SS	24	1-1 1-1	14						2					
			16											
			18	Brown, dense, fine to coarse GRAVEL (alluvium), much fine to coarse grained sand.										
6 SS	24	12-24 50	20		GP				74					
			22											
			24	End of boring at 24'										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Daniel R. Reed Firm: **SEH Inc** 421 Frenette Drive Chippewa Falls, WI 54729 www.sehinc.com Tel: 715.720.6200 Fax: 715.720.6300

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
St. Louis Ponds Area, Rico, Colorado	AARCOE0105.00	EB-2D

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jeff Pennell Layne-Western	11/18/2004	11/19/2004	odex

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet Site	8,826.0 Feet Site	5.0 inches

Local Grid Origin ☒ (estimated: ☐) or Boring Location ☐
State Plane N, E S/C/N
NW 1/4 of NW 1/4 of Section 25, T 40 N, R 10 W
Lat ° ' "
Long ° ' "
Local Grid Location ☒ N ☒ E
1388306 Feet ☐ S 2267920 Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
			Rico, Colorado

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	FILL: Gray, very dense, WASTE ROCK, igneous cobbles										
1 SH	24		2	FILL ("Calcine Tailings"): Purple-maroon to gray, loose to medium dense, fine to very fine grained, SILTY SAND, rare gravel	SM									Note: Compressive Strength = SPT N value Note: Length att. on split spoon = 24" 3" diameter split spoon used (no shelby rec)
2 SH	24		4											
1 SS	24		6											
3 SH	24		8											
4 SH	24		10											
2 SS	24	4-1 1-4	12						2					
			14											
			16											
			18	Brown, dense, fine to coarse GRAVEL (alluvium), much fine to coarse grained sand.	GP									
			20											
			22											
			24											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: Daniel R. Reed Firm: SEH Inc 421 Frenette Drive Chippewa Falls, WI 54729 www.sehinc.com Tel: 715.720.6200 Fax: 715.720.6300

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number EB-2D Use only as an attachment to Form 4400-122.

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				End of boring at 24' (abandoned - moved to EB-2, approx. 10' to east)										

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **ED-4**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,810.2 Feet

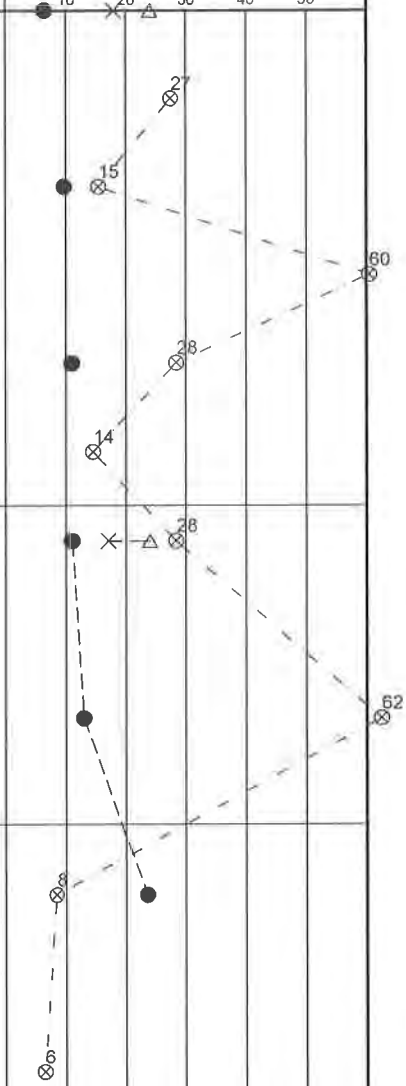
DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL
		GB			FILL - Clayey Silty Sandy Cobbly GRAVEL (GC-GM) - predom. angular to subangular gravel - approximately 40% gravel, 40% sand and 20% fines - fines moderately plastic - medium dense to dense - dark brown 10YR 3/4 - slightly moist
	1	GB			Thin calcine layer at 2.0'
		GB			Thin calcine layer at 3.0'
5.0		GB			
	2	GB			
		GB			Scattered oxidized waste rock 7.5-9.0'
	3	GB			
		GB			9.0-10.0' - Significant increase in gravel size -approximately 50% gravel, 40% sand and 10% silt - cobbles to 3.5" - reddish gray 10YR 5/1
10.0	4	GB			
		GB			Tending toward predom. subrounded gravel 12.0-14.0' - dark reddish brown
	5	GB			Rock in tip at 13.25'
14.0					Thin calcine layer at 14.0'
15.0		GB			ALLUVIUM - Silty Sandy GRAVEL (GW) - approximately 60% gravel, 30% sand and 10% silt - subrounded to subangular gravel - medium dense to dense - reddish brown 5YR 4/3 - wet
	6	GB			
		GB			Significant change in fines at 15.0' - approximately 20% clay, 40% sand and 40% gravel - fines moderate to high plasticity - cobbles to 4" - moist (GC)
20.0					
	7	GB			Becoming wet
23.0					Large 5" cobble
		GB			ALLUVIUM - fine to medium grained SAND (SP), <5% Silt - scattered angular to well rounded gravel - dark reddish brown 5YR 4/3 - loose - moist to wet
25.0	8	GB			24.0-25 0': Up to 30% gravel content and coarse sand - wet (SW)
		GB			25.0-26.0': No gravel - transitions to silty fine sand with <10% silt - yellowish red 5YR 4/6 (SM)
30.0					26 0-30.0': Transitions to <5% silt fines (SP)
	9	GB			
31.5					31.5
					End of Boring
					Backfilled with bentonite (9 bags)
					Boring logged by: A. Jewell
					Casing: 5.5" I.D.

UNIT DRY WT LBS./FT³

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING 1387671		BORING STARTED 10/2/11		AECOM OFFICE Denver	
EASTING 2268071		BORING COMPLETED 10/2/11		ENTERED BY SJH	SHEET NO 1 OF 1
WL 14.0' WD		RIG/FOREMAN MINI-SONIC C100/D. Cervantes		APP'D BY EED	AECOM JOB NO 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: ED-102

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

SURFACE ELEVATION +8,827.3 Feet

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
	1	AS		FILL: Well graded fine to coarse angular to subangular gravel with silt and sand - 35% fine to coarse sand, 15% fine silt and clay - dark brown 10yr 3/3 - dry (FILL: GM)	
		RB		1.0	
	2	SS		FILL: Silty GRAVEL with sand, 30% fine to coarse sand, 20% fine silt and clay - dark brown 10yr 3/3 - moist - medium dense to very dense - (FILL: GM/GC) zones of mine waste rock mixed in	
		RB			
	3	SS			
5.0		RB		5 feet change to loose	
	4	SS			
	RB			7.0	
	5	SS		FILL: Silty sandy gravel - 57% fine to coarse gravel, 31.5% fine to coarse sand - 11.5% silt/clay (seams) - dark reddish brown 5yr 3/3 - loose to medium dense - wet (FILL: GM)	
	5	SS		Driller notes possible voids 9' to 10'	
10.0		RB		10.2	
	7	SS		Fill (MINE WASTE ROCK): Sandy silt - 2% fine gravel, 47% fine to coarse sand, 51% silt/clay - dark brown 7.5yr 3/2 - loose - moist - non plastic - (FILL: ML - MINE WASTE ROCK)	
		RB		12.5	
	8	SS		FILL: Clayey sand, little gravel - 15% fine to medium subangular gravel, 52% fine to coarse subangular to subrounded sand, 33% silt & clay - dark brown 7.5yr 3/2 - loose - wet (FILL: SC)	
15.0		RB		14.5	
	9	SS		Colluvium/Possible FILL WASTE ROCK: Silty GRAVEL with sand, fine to coarse angular to subangular gravel, 35% fine to coarse subrounded to subangular sand, 15% silt & clay - black 5y 2.5/2 - loose - wet (Possible FILL: GM)	
		RB		16.8	
	10	SS		cobble 16.5'	
	10	SS		18.1	
	10	SS		18.3 Possible FILL: Silty sand with gravel, 40% subangular to subrounded fine to coarse sand, 27% silt, 10% fine to coarse subangular to subrounded gravel, trace clay, trace stick fragments, root fragments & other organic material - very dark brown 10yr 2/2 - medium dense - moist (possible FILL: SM)	
20.0		RB			
	11	SS		Organic silt, fibrous plant material, sticks & roots - black 2.5y 2/0 - moist - stiff - (OL)	
		RB			
	12	SS		Partly organic silty clay with sand, 25% fine to coarse subangular to subrounded sand, trace fibrous plant material & fine roots, black 5y 2.5/1 - wet - very soft - (CL) but grades into (CL/OL) then to sandy SILT (ML) also with zones of 45% sand - variable	
25.0		RB		24.5	
	13	SS		24.9 ROCKS: Cobbles & Boulders drill action	
		RB		Allivium/Colluvium mix: Well graded GRAVEL with sand, subrounded to angular gravel, 30% fine to coarse rounded to subangular sand - dark olive gray 5y 3/2 - saturated - dense - (GW)	
30.0				30.0	

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 2

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **ED-102**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,827.3 Feet (Continued)		
31.5	14	SS			Allivium: Well graded GRAVEL with sand, 65% subrounded to mostly subangular gravel, 30% subrounded to subangular sand, 5% clay fines, scattered cobbles - dark yellowish brown 10yr 3/4 - wet - very dense - (GW) 31.5		* Calibrated Penetrometer
					End of boring at 31.5'		
					HQ casing advanced to 12.5 feet. Boring advanced to 30.0 feet with 2-15/16" tricone roller bit. Borehole tremie grouted with high solids bentonite grout.		

66

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING 1388184.386	BORING STARTED 10/4/12	AECOM OFFICE Denver	
EASTING 2267992.425	BORING COMPLETED 10/5/12	ENTERED BY DCJ	SHEET NO. 2 OF 2
WL W.L. @ 12.5 W.D.	RIG/FOREMAN AMS Compact Sonic 10-C/Greg Schroth	APP'D BY	AECOM JOB NO. 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **ED-103**
PROJECT NAME: **Rico - Argentine Mine Site**	ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

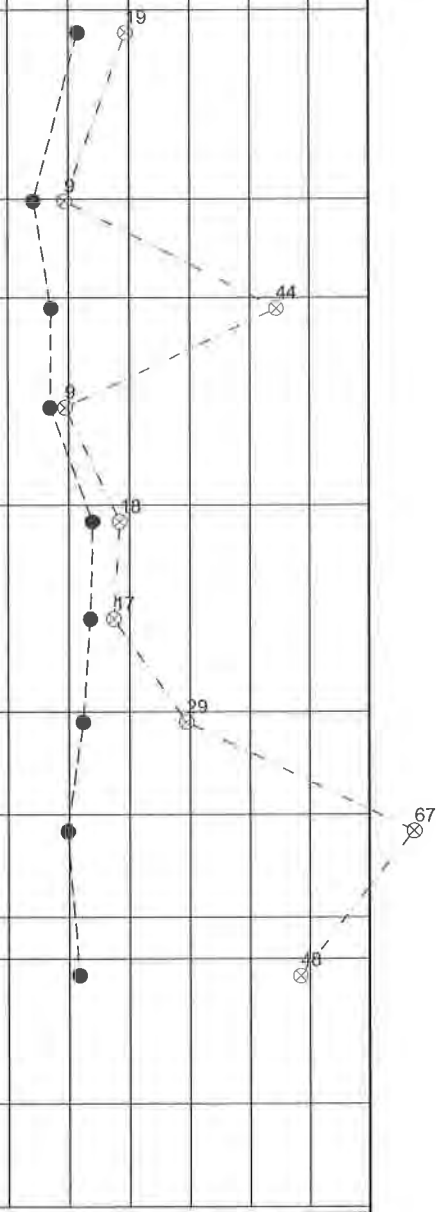
SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,811.5 Feet	
		RB			FILL: Well graded gravel with silt and sand - 35% fine to coarse sand, 20% silt and clay - 10YR5/3 brown - moist (FILL: GM)	
	1	SS			1.0 FILL: Well graded sand with clay and gravel - 35% fine to coarse angular gravel, 41% fine to coarse sand, 24% clay and silt - 10YR3/3 dark brown - medium dense - moist (FILL: SC)	
		RB				
5.0					5.6	
	2	SS			FILL: Poorly graded sand with gravel - coarse to medium angular to subangular sand, 40% fine to coarse angular to subangular, 5% fines - 10YR3/3 brown - loose - moist (FILL: SP)	
		RB			8.0	
	3	SS			100% loss of drilling fluid while drilling between 5.6 ft and 7.6 ft. Driller noted no down pressure required while drilling from 7.0 to 10.0 ft. Possible void or very loose conditions at 8.0 ft.	
10.0						
		RB				
	4	SS			FILL: Well graded gravel, little fine to coarse sand, trace silt - 75% fine gravel up to 1" diameter, 19% fine to coarse sand, 6% silt/clay - 7.5YR3/2 dark brown - dense to loose - wet (FILL: GW)	
		RB			13.0	
	5	SS			Clayey gravel - 48% angular to subrounded gravel, 30% fine to coarse sand, 22% silt/clay - 10YR5/6 yellowish brown and 2.5YR3/4 dark reddish brown - medium dense - wet (GC)	
15.0						
		RB				
	6	SS				
		RB			18.0	
	7	SS			Gravel, clay, sand, silt mixture -70% gravel/rock fragments, 2% clay, 5% sand, 5% silt - 10YR5/4 Yellowish brown - medium dense - wet (GC)	
20.0						
		RB			20.5	
	8	SS			Poorly graded gravel, sand, clay, silt mixture - 68% fine to coarse gravel, 24% fine to coarse sand, 6% clay/silt - 10YR4/3 brown - very dense - wet (GP)	
		RB			23.0 Boulder 24.0	
25.0	9	SS			Poorly graded gravel, sand, clay, silt mixture - 70% fine to coarse gravel, 15% fine to coarse sand, 15% clay/silt - 10YR4/3 brown - dense - wet (GC)	
27.5					27.5	
					End of boring at 27.5'. Boring advanced with roller bit and HQ casing. Borehole backfilled with bentonite grout.	



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1387856.435**	BORING STARTED: **10/26/12**	AECOM OFFICE: **Denver**	
EASTING: **2267994.083**	BORING COMPLETED: **10/27/12**	ENTERED BY: **AMH**	SHEET NO.: **1** OF **1**
WL: **None Observed**	RIG/FOREMAN: **Modified Ditchwitch/Cory Watson**	APP'D BY:	AECOM JOB NO.: **60239818**

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: ED-108

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
				SURFACE ELEVATION +8,810.8 Feet	
	1	AS		FILL: Well graded gravel with silt and sand - fine to coarse subrounded gravel, 35% fine to coarse sand, 20% fines, mostly silt - dark brown 7.5YR3/2 - moist (FILL: GM)	
2.0					
	2	SS		FILL: Well graded sand with silt, clay, and fine to coarse gravel - 28% fine to coarse gravel, 43% fine to coarse angular to subrounded sand, 19% to 29% fines - dark brown 7.5Y3/2 - dense to very dense - moist (FILL: SM)	
		HSA			
5.0	3	SS			
		HSA			
	4	SS			
10.0		HSA			
10.0	4	SS		FILL: Well graded gravel with clay and sand - fine to coarse angular to subrounded gravel, 30% fine to coarse sand, 20% fines - dark brown 7.5Y3/4 - loose - moist to wet (FILL: GC)	
		HSA			
12.5	5	SS		Organic silty clay with roots and fine fibrous plant material - black 10YR2/1 - firm to soft (OL) (LOI = 5.31%) Following completion of boring, offset borings performed to obtain shelby tube from 12.5 ft-14.5 ft Qp = 0.25 tsf. Second shelby tube obtained from 14.5 ft-16.5 ft.	
15.0		HSA			
	6	SS			
		HSA			
17.5	7	SS		Well graded gravel with sand – 57% fine to coarse broken angular gravel, 37% fine to coarse angular to subrounded sand, 8% fines - very dark grayish brown 2.5Y3/2 - medium dense - wet (GW)	
20.0		HSA			
20.0	8	SS		Well graded gravel with silt and sand - fine to coarse angular to subrounded gravel, 35% fine to coarse angular to subrounded sand, 20% fines - very dark grayish brown 10YR3/2 - very dense - wet (GM)	
21.5		HSA			
22.0	9	SS		BOULDER	
24.0		HSA		Well graded gravel with silt and sand - fine to coarse angular to subrounded gravel, 35% fine to coarse angular to subrounded sand, 20% fines - very dark grayish brown 10YR3/2 - very dense - wet (GM)	
25.0	10	SS		Poorly graded sand - 2% fine gravel, 89% fine rounded to subrounded sand, 9% fines- dark reddish brown 5YR3/3 to 7.5YR3/4 - loose to medium dense - wet (SP-SM)	
		RB			
30.0					

40/0" 5 3 8 4 22 78 50/2" 10

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 3

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: ED-108

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,810.8 Feet (Continued)	
	11	SS			Poorly graded sand - 2% fine gravel, 89% fine rounded to subrounded sand, 9% fines- dark reddish brown 5YR3/3 to 7.5YR3/4 - loose to medium dense - wet (SP-SM)	
		RB				
	12	SS				
35.0		RB			35.0	
	13	SS			Very fine to fine poorly graded sand, some silt (28%) - dark yellowish brown 10YR4/.4 - loose - wet (SM)	
		RB			37.5	
	14	SS			Very fine to fine poorly graded sand, some silt (29.2%) - brown 7.5Y4/4 - loose - wet (SM)	
40.0		RB				
	15	SS				
		RB			42.5	
	15	SS			Very fine to fine poorly graded sand with 9% silt - brown 7.5Y4/4 - medium dense - wet (SP-SM)	
45.0		RB			45.0	
	16	SS			Very fine to fine poorly graded sand, trace silt - brown 7.5YR4/2 - loose -wet (SP)	
		RB			47.5	
	17	SS			Silt (non-plastic), with very fine sand - 6% very fine sand - dark reddish brown 5Y3/4 - very loose - wet (ML)	
50.0		RB			50.0	
	18	SS			Well graded gravel and sand with silt - 53% angular to subrounded gravel, 36% angular to subrounded sand, 11% fines - dark reddish brown 5Y4/7 - medium dense - wet (GW-GM)	
		RB			52.0	
	19	SS			Well graded gravel with sand - fine to coarse angular to subrounded gravel, 40% fine to coarse angular to subrounded sand, 7% fines - dark reddish brown 5Y3/4 - medium dense - wet (GW-GM)	
55.0		RB				
	20	SS				
60.0					60.0	

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 2 OF 3

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: ED-108

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

SURFACE ELEVATION +8,810.8 Feet (Continued)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
		RB			Silt and very fine sand (35%) - dark reddish brown 5YR4/2 - medium dense - wet (ML)	
	21	SS				
65.0		RB			Occasional gravel seams noted from 62.5' to 67.5'	
					67.0	
	22	SS			Well graded gravel with fine to coarse sand - angular to subrounded gravel, 30% fine to coarse subangular to subrounded sand, 7% fines - brown 7.5YR4/2 - medium dense to dense - wet (GW-GM)	
70.0		RB				
	23	SS				
75.0		RB				
	24	SS				
79.0					79.0	
					End of boring at 79.0'. Boring advanced with HSA to 25 ft. Boring advanced with 3 7/8" tricone roller bit to 77.5 ft. Boring advanced with split-spoon sampler to 79 feet. Borehole tremi grouted with high solids bentonite grout.	

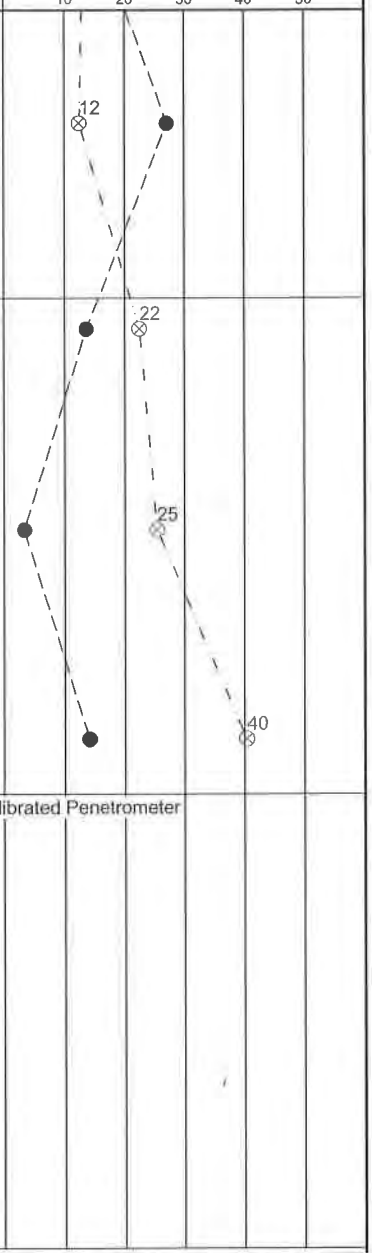
UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT)

10 20 30 40 50



* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING 1387709.662	BORING STARTED 10/27/12	AECOM OFFICE Denver	
EASTING 2268112.799	BORING COMPLETED 10/29/12	ENTERED BY AMH	SHEET NO. 3 OF 3
WL W.L. @ 10.0' W.S. / 11.3' A.C.R	RIG/FOREMAN CME-85/Rory Pilmore	APP'D BY	AECOM JOB NO. 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM	CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **ED-108A**
	PROJECT NAME: **Rico - Argentine Mine Site**	ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

SURFACE ELEVATION +8,810.8 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					Offset boring 5' from ED-108 to obtain 3" Shelby Tubes. 16.5 feet S26 3" shelby tube observed sand & gravel on the bottom end of shelby tube.		
5.0		HSA					
10.0							
	S25	ST				84 *	
15.0	S26	ST				77	
16.5				16.5	End of boring at 16.5 feet. Blank drilled with 4-1/4" ID HSA to 12.5 feet, then obtained 3" shelby tube samples from 12.5 to 14.5 feet, and 14.5 to 16.5 feet. Borehole grouted with high solids bentonite grout to full depth.		

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1387709.662**	BORING STARTED: **10/29/12**	AECOM OFFICE: **Denver**	
EASTING: **2268112.799**	BORING COMPLETED: **10/29/12**	ENTERED BY: **DCJ**	SHEET NO.: **1** OF **1**
WL	RIG/FOREMAN: **CME-85/Rory Pilmore**	APP'D BY	AECOM JOB NO.: **60239818**

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

CDPHE
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246

WELL DEVELOPMENT DATA AND SAMPLE FORM SUMMARY

Records Management Data

Project Number: Rico Light Industrial Park	Project Name: Rico Light Industrial Park
Well Number: RLP-GW1	Well Location: Rico Light Industrial Park

Time / Date:	10/16/02	Elevation :	8,800 msl
Drilling Method:	4-Inch Hollow Stem Auger	Weather:	Clear Skies, Partly Sunny 60°F
Development Company:	Kaventa Consulting		Slight Breeze
Date Development Started:	10/16/02	Date Development Completed:	10/16/02
Screen Intervals: 4ft. To 9 ft bgs		Well Diameter:	2 Inch
Depth of Well (L^w):	9 ft.	Depth to Water Before Development (L^l):	6.5 ft.
Height of Water Column (L^w - L^l):	6 ft.		
Depth to Top of Sediment (L^l)	9 ft.	Sediment Thickness (L^w - L^l):	Na ft.
Well Volume:	0.96 gal.		
Total Volume Pumped:	30 gal.		
Number of Well Volumes Pumped	(total volume pumped/well volume):	30+ volumes pumped on 10/16/02	0.16 gallons per foot on a 2-Inch Well

Monitoring Well Sample Data : Well RLP-GW1

Date	Temp	pH	Cond	Gallons Purged	Observations
10/16/02	11.2	7.37	359	27	Slightly turbid
10/16/02	10.8	7.36	359	29	Clear, Slightly turbid

* Sample collection continued after well development includes well development purge volumes

10/16/02 @ 1345 — Sample Collected

Lithology

0-9 feet — Native rocky cobble material

Presented By	Date	Checked By	Date

CDPHE
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246

WELL DEVELOPMENT DATA AND SAMPLE FORM SUMMARY

Records Management Data

Project Number: Rico Light Industrial Park	Project Name: Rico Light Industrial Park
Well Number: RLP-GW2	Well Location: Rico Light Industrial Park

Time / Date:	10/16/02	Elevation	8,800 msl
Drilling Method:	4-Inch Hollow Stem Auger	Weather:	Clear Skies, Partly Sunny 60°F
Development Company:	Kayenta Consulting		Slight Breeze
Date Development Started:	10/16/02	Date Development Completed:	10/16/02
Screen Intervals: 10.5 ft. To 20.5 ft bgs		Well Diameter:	2 Inch
Depth of Well (L^*):	20.5 ft.	Depth to Water Before Development (L^1):	6.5 ft.
Height of Water Column ($L^* - L^1$):	2.0 ft.		
Depth to Top of Sediment (L^1)	20.5 ft.	Sediment Thickness ($L^* - L^1$):	Na ft.
Well Volume:	0.32 gal.		
Total Volume Pumped:	5 gal.		
Number of Well Volumes Pumped	(total volume pumped/well volume):	4x volumes pumped on 10/16/02	0.16 gallons per foot on a 2-Inch Well

Monitoring Well Sample Data : Well RLP-GW2

Date	Temp	pH	Cond	Gallons Purged	Observations
10/16/02	11.9	7.29	1004	Purged dry four times Total of 5 gallons max	Clear

* Sample collection continued after well development includes well development purge volumes

10/16/02 @ 1620 — Sample Collected

Lithology

0-12 feet	Spent pyretic ore with mixed coble and rock. Ore materials are green and purple in color. Leach pad liner at 12 feet bgs
12-20.5 feet	Native rocky cobble material

Presented By	Date	Checked By	Date

CDPHE
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246

WELL DEVELOPMENT DATA AND SAMPLE FORM SUMMARY

Records Management Data

Project Number: Rico Light Industrial Park	Project Name: Rico Light Industrial Park
Well Number: RLP-GW3	Well Location: Rico Light Industrial Park

Time / Date:	10/16/02	Elevation:	8,800 msl
Drilling Method:	4-Inch Hollow Stem Auger	Weather:	Clear Skies, Partly Sunny 60°F
Development Company:	Kaventa Consulting		Slight Breeze
Date Development Started:	10/16/02	Date Development Completed:	10/16/02
Screen Intervals: 7 ft. To 16.5 ft bgs		Well Diameter:	2 Inch
Depth of Well (L^w):	16.5 ft.	Depth to Water Before Development (L^l):	6.5 ft.
Height of Water Column ($L^w - L^l$):	9.5 ft.		
Depth to Top of Sediment (L^l)	16.5 ft.	Sediment Thickness ($L^w - L^l$):	Na ft.
Well Volume:	1.12 gal.		
Total Volume Pumped:	15 gal.		
Number of Well Volumes Pumped	(total volume pumped/well volume):	14 volumes pumped on 10/16/02	0.16 gallons per foot on a 2-Inch Well

Monitoring Well Sample Data : Well RLP-GW3

Date	Temp	pH	Cond	Gallons Purged	Observations
10/16/02	11.6	6.46	1526	5	Slightly turbid
10/16/02	10.9	6.45	1529	7	Slightly turbid
10/16/02	10.6	6.44	1484	8	Slightly turbid
10/16/02	10.8	6.42	1512	9	Clear, Slightly turbid

* Sample collection continued after well development includes well development purge volumes

10/16/02 @ 1100 — Sample Collected

Lithology

0-3.5 feet	Spent pyretic ore with mixed coble and rock.
3.5-16.5 feet	Native rocky cobble material

Presented By	Date	Checked By	Date

CDPHE Colorado Department of Public Health and Environment 4300 Cherry Creek Drive South Denver, CO 80246	**WELL DEVELOPMENT DATA AND SAMPLE FORM SUMMARY**	Records Management Data

Project Number: Rico Light Industrial Park	Project Name: Rico Light Industrial Park
Well Number: RLP-GW5	Well Location: Rico Light Industrial Park

GW
Common El. all wells
- datum UNKNOWN

Time / Date:	10/17/02	Elevation :	8,800 msl
Drilling Method:	4-Inch Hollow Stem Auger	Weather:	Clear Skies, Partly Sunny 60°F
Development Company:	Kaventa Consulting		Slight Breeze
Date Development Started:	10/17/02	Date Development Completed:	10/17/02
Screen Intervals: 18 ft. to 23 ft bgs		Well Diameter:	2 Inch
Depth of Well (L^w):	23 ft.	Depth to Water Before Development (L^i):	15 ft.
Height of Water Column (L^w - L^i):	8 ft.		
Depth to Top of Sediment (L^i)	14ft.	Sediment Thickness (L^w - L^i):	Na ft.
Well Volume:	1.28 gal		
Total Volume Pumped:	46 gal		
Number of Well Volumes Pumped	(total volume pumped/well volume):	46 gallons purged on 10/17/02	0.16 gallons per foot on a 2-Inch Well

Monitoring Well Sample Data : Well RLP-GW5

Date	Temp	pH	Cond	Gallons Purged	Observations
10/17/02	13.8	6.89	2620	45	Slightly turbid
10/17/02	13.4	6.90	2620	45.5	Clear, Slightly turbid
	13.7	6.91	2610	46	Clear

* Sample collection continued after well development includes well development purge volumes

10/17/02 @ 1145 — Sample Collected

Lithology

0-2 feet bgs	Waste rock materials
2-23 feet bgs	Purple roasted tailings, wet

Presented By	Date	Checked By	Date

CDPHE Colorado Department of Public Health and Environment 4300 Cherry Creek Drive South Denver, CO 80246	WELL DEVELOPMENT DATA AND SAMPLE FORM SUMMARY	Records Management Data

Project Number: Rico Light Industrial Park	Project Name: Rico Light Industrial Park
Well Number: RLP-GW6	Well Location: Rico Light Industrial Park

Time / Date:	10/17/02	Elevation :	8,800 msl
Drilling Method:	4-Inch Hollow Stem Auger	Weather:	Clear Skies, Partly Sunny 60°F
Development Company:	Kayenta Consulting		Slight Breeze
Date Development Started:	10/17/02	Date Development Completed:	10/17/02
Screen Intervals: 12 ft. to 17 ft bgs		Well Diameter:	2 Inch
Depth of Well (L^w):	30 ft.	Depth to Water Before Development (L^i):	25 ft.
Height of Water Column (L^w - L^i):	5 ft.		
Depth to Top of Sediment (L^s)	30ft.	Sediment Thickness (L^w - L^s):	Na ft.
Well Volume:	0.8 gal.		
Total Volume Pumped:	8 gal.		
Number of Well Volumes Pumped	(total volume pumped/well volume):	8+ volumespurged on 10/17/02	0.16 gallons per foot on a 2-Inch Well

Monitoring Well Sample Data : Well RLP-GW6

Date	Temp	pH	Cond	Gallons Purged	Observations
10/17/02	13.1	6.49	4000	6	Slightly turbid
10/17/02	12.6	6.38	3970	7	Clear, Slightly turbid
10/17/02	13.1	6.42	4110	8	Clear
			* Purged dry total of 8 times, Collected sample on 9th recharge		

* Sample collection continued after well development includes well development purge volumes

10/17/02 @ 1645 — Sample Collected

Lithology

0-18 feet bgs	Purple roasted tailings mixed with waste rock and river cobble
18-30 feet bgs	Native Rock, Cobble

Presented By	Date	Checked By	Date

CDPHE
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246

WELL DEVELOPMENT DATA AND SAMPLE FORM SUMMARY

Records Management Data

Project Number: Rico Light Industrial Park	Project Name: Rico Light Industrial Park
Well Number: RLP-GW7	Well Location: Rico Light Industrial Park

Time / Date:	10/17/02	Elevation :	8,800 msl
Drilling Method:	4-Inch Hollow Stem Auger	Weather:	Clear Skies, Partly Sunny 60°F
Development Company:	Kaventa Consulting		Slight Breeze
Date Development Started:	10/17/02	Date Development Completed:	10/17/02
Screen Intervals: 19 ft. to 24 ft bgs		Well Diameter:	2 Inch
Depth of Well (L^w):	24 ft.	Depth to Water Before Development (L^l):	19 ft.
Height of Water Column (L^w - L^l):	5 ft.		
Depth to Top of Sediment (L^s)	24 ft.	Sediment Thickness (L^w - L^s):	Na ft.
Well Volume:	0.8 gal.		
Total Volume Pumped:	35 gal.		
Number of Well Volumes Pumped	(total volume pumped/well volume):	43+ volumes purged on 10/17/02	0.16 gallons per foot on a 2-Inch Well

Monitoring Well Sample Data : Well RLP-GW7

Date	Temp	pH	Cond	Gallons Purged	Observations
10/17/02	15.5	6.51	1679	26	Slightly turbid
10/17/02	15.7	6.51	1719	35	Clear

* Sample collection continued after well development includes well development purge volumes

10/17/02 @ 1550 — Sample Collected

Lithology

0-24 feet bgs — Waste rock / river cobble

Presented By	Date	Checked By	Date

CDPHE Colorado Department of Public Health and Environment 4300 Cherry Creek Drive South Denver, CO 80246	**WELL DEVELOPMENT DATA AND SAMPLE FORM SUMMARY**	Records Management Data:

Project Number: Rico Light Industrial Park	Project Name: Rico Light Industrial Park
Well Number: RLP-GW8	Well Location: Rico Light Industrial Park

Time / Date:	10/17/02	Elevation :	8,800 msl
Drilling Method:	4-Inch Hollow Stem Auger	Weather:	Clear Skies, Partly Sunny 60°F
Development Company:	Kayenta Consulting		Slight Breeze
Date Development Started:	10/17/02	Date Development Completed:	10/17/02
Screen Intervals: 25 ft. to 30 ft bgs		Well Diameter:	2 Inch
Depth of Well (L^w):	30 ft.	Depth to Water Before Development (L^i):	25 ft.
Height of Water Column (L^v - L^i):	5 ft.		
Depth to Top of Sediment (L^i)	30 ft.	Sediment Thickness (L^w - L^i):	Na ft.
Well Volume:	0.8 gal.		
Total Volume Pumped:	24 gal.		
Number of Well Volumes Pumped	(total volume pumped/well volume):	24+ volumes purged on 10/17/02	0.16 gallons per foot on a 2-Inch Well

Monitoring Well Sample Data : Well RLP-GW8

Date	Temp	pH	Cond	Gallons Purged	Observations
10/17/02	13.0	6.46	2510	22	Clear, Slightly turbid
10/17/02	12.9	6.58	2520	23	Clear, Slightly turbid
10/17/02	12.5	6.64	2520	24	Clear, Slightly turbid

* Sample collection continued after well development includes well development purge volumes

10/17/02 @ 1735 — Sample Collected

Lithology

0-1 feet bgs	Fill material
1-24 feet bgs	Red purple slimes, roasted tailings, saturated
24 – 30 feet bgs	Native materials, river cobble

Presented By	Date	Checked By	Date

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-1D**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,811.0 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL
		GB		FILL - Clayey Sandy Cobbly GRAVEL (GC) - approximately <5% cobble, 40% gravel, 40% sand and 20% fines - fines moderately plastic - cobbles to 3.5" or larger - subrounded to subangular - roots to 5.0' or greater - dark brown 7.5 YR 3/2 - medium dense and loose
	1	GB		
5.0		GB		
	2	GB		
		GB		
	3	GB		7.5' - Color changes to brown 7.5YR 4/4 - less cobbles
				Plant debris at 9.0'
10.0		GB		
10.8	4	GB		10.0' - Overbank alluvium - sandy
11.3		GB		Black Organic SILT (OL) - organic smell - moderate plasticity - decayed roots
	5	GB		ALLUVIUM - Clayey Silty Sandy GRAVEL (GM-GC) with Cobbles to 4.0" - Approximately 50% gravel and cobbles, 25% sand and 25% fines - fines moderately plastic - predom. subangular to subrounded - black 5YR 2.5/1 - dense to extremely dense
15.0		GB		
	6	GB		
		GB		
20.0				
	7	GB		
		GB		23.0' - Color changes to strong brown 7.5YR 4/6 - gravels become predom. subrounded
25.0				
	8	GB		
		GB		
30.0				
31.5	9	GB		
31.5				Possible reduction in gravel size at 30.5' - fine silty sand
				End of Boring
				Boring logged by: A. Jewell
				Casing: 5.5" I.D.
				Boring completed as 2.0" diameter monitoring well: 0.010" PVC screen 15.0-25.0' with bottom plug and sand pack 14.0-27.0' - 15.0' SCH 40 PVC riser with flush mounted cover.

UNIT DRY WT LBS /FT³

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

10 6 11 11 65 53 56 34 81

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING 1387829	BORING STARTED 9/29/11	AECOM OFFICE Denver		
EASTING 2267941	BORING COMPLETED 9/30/11	ENTERED BY SJH	SHEET NO 1 OF 1	
WL 7.0' WD	RIG/FOREMAN MINI-SONIC C100/D. Cervantes	APP'D BY EED	AECOM JOB NO 60157757	

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-1S**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,811.1 Feet		
					No logging - No sampling See MW-1D		
5.0							
10.0					10.0		
					Boring completed as 2.0" diameter monitoring well: 0.010" PVC screen 4.0-9.0' with bottom plug and sand pack 3.0-10.0' - 4.0' SCH 40 PVC riser with flush mounted cover.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING **1387827**	BORING STARTED **9/30/11**	AECOM OFFICE **Denver**	
EASTING **2267945**	BORING COMPLETED **9/30/11**	ENTERED BY **SJH**	SHEET NO **1** OF **1**
WL	RIG/FOREMAN **MINI-SONIC C100/D. Cervantes**	APP'D BY **EED**	AECOM JOB NO **60157757**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **MW-4D/4DR**
PROJECT NAME: **Rico-Argentine Site - OU01**	ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,816.6 Feet

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT^3	STANDARD PENETRATION BLOWS/(FT)
		GB			FILL - Clayey Cobbly Sandy GRAVEL (GC) - approximately 50% gravel and cobbles, 30% sand and 20% clayey fines - moderately plastic - predom. subangular to angular gravel - dark reddish brown 5YR 3/3 - dense to loose - moist		
	1	GB			Becoming very cobbly (GW-GC) - cobbles up to 6.0" - up to 30% cobble content - Becoming slightly moist - color change to dark reddish gray 2.5YR 3/1		33
5.0		GB					
	2	GB					52
		GB					
	3	GB					22
10.0		GB					8
	4	GB			Possible fill/colluvium contact at 11.0' - clayey cobbly sandy gravel (GC) - approximately 50% gravel, 30% sand and 20% moderate plasticity clay fines - cobbles to 6.0" or larger - predom. subangular to angular gravel - reddish brown 7.5YR 3/4 - moist		
		GB			Large greenstone boulder in hole from 12.0-16.0'		
15.0	5	GB			Transitions to yellowish red 7.5YR 4/6 from 12.5-15.0'		24
		GB			15.0-20.0' - Poor recovery - possible voids		
					Offset boring 10.0' southwest - renamed MW-4DR		
					19.5		
20.0					ALLUVIUM - Cobbly Clayey Silty Sandy GRAVEL (GM-GC) - approximately 25% cobbles, 30% gravel, 30% sand and 15% clay/silt fines - cobbles up to 6.0" - predom. rounded to subrounded - brown 7.5YR 4/4 - dense to extremely dense - wet		40
	6	GB					
		GB			24.0-25.0' - <5% fines, 30% sand, 60% gravel and slight organic content - black (GW)		
25.0							50/6"
	7	GB			25.0-30.0' - Core sample mixed - becomes red below approximately 27.0' - includes predom. angular to subangular gravels - predom. silt fines (GW)		
		GB					
30.0					Transitions to predom. subrounded to rounded gravel with clay fines up to 15% from 30.0-32.0' (GW-GC)		8
					32.0		
33.5	8	GB			ALLUVIUM - fine to medium Silty SAND (SM) with scattered coarse grained Sand and Gravel up to 1.0" - subangular to subrounded - yellowish red 5YR 5/8		
					33.5		
					End of Boring		
					Boring logged by: A. Jewell		
					Boring completed as 2 0" diameter monitoring well: 0.010" PVC screen 21.0-31.0' with bottom plug and sand pack 21.0-32.0' - 21.0' SCH 40 PVC riser with flush mounted cover.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1387837**	BORING STARTED: **10/5/11**	AECOM OFFICE: **Denver**	
EASTING: **2268222**	BORING COMPLETED: **10/5/11**	ENTERED BY: **SJH**	SHEET NO: **1** OF: **1**
WL: **19.5' WD**	RIG/FOREMAN: **MINI-SONIC C100/D. Cervantes**	APP'D BY: **EED**	AECOM JOB NO: **60157757**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-4S**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT^3	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,817.1 Feet		
					No logging - No sampling See MW-4D		
5.0							
10.0							
15.0							
19.0					19.0		
					Boring completed as 2.0" diameter monitoring well: Total depth 19.0' - 0.010" PVC screen 8.0-18.0' with bottom plug and sand pack 8.0-19.0' - 8.0' SCH 40 PVC riser with flush mounted cover.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1387839	BORING STARTED: 10/5/11	AECOM OFFICE: Denver	
EASTING: 2268225	BORING COMPLETED: 10/5/11	ENTERED BY: SJH	SHEET NO: 1 OF: 1
WL	RIG/FOREMAN: MINI-SONIC C100/D. Cervantes	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-5D**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

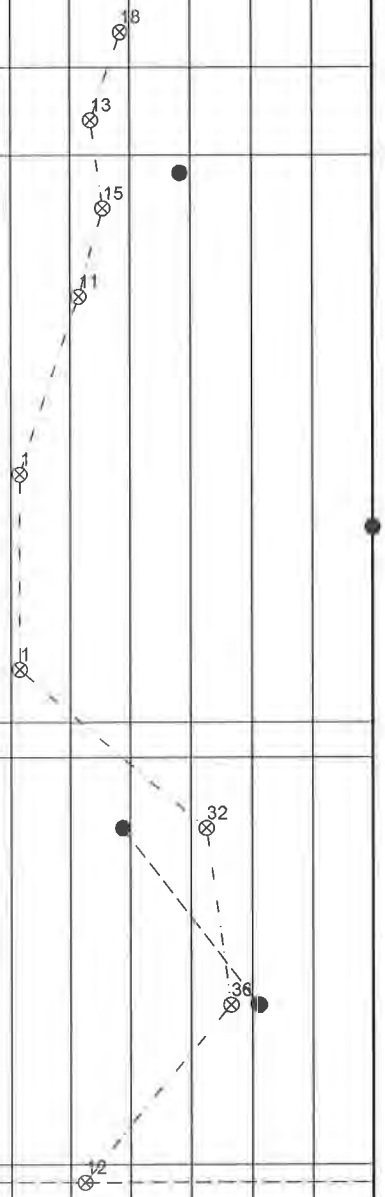
SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS /FT^3
					SURFACE ELEVATION +8,831.1 Feet	
		GB			PDF EMBANKMENT FILL - Silty Sandy GRAVEL (GW) - subangular to subrounded - medium dense - brown 7.5 YR 4/4 - moist	
	1	GB				
		GB			3.5 FILL - Oxidized material - Clayey SAND (SC) - low plasticity fines - dark reddish brown 2.5YR 2.5/3 - loose - moist	
5.0	2	GB			6.0 FILL - Calcines - Silty fine SAND (SP) and silt sized - estimated <10% fines - reddish purple (no munsell) - medium dense to very loose - moist	
		GB				
	3	GB				
10.0		GB				
	4	GB				
		GB				
15.0						
	5	GB			Becoming wet and black/reddish purple below 15.0'	
		GB			Becomes silty with low plasticity fines at 17.0;' - estimated up to 30% silt	
20.0						
	6	GB			22.0	
		GB			23.0 Organic SILT (ML-OL) - probable overbank deposits - decayed plant fibers - trace fine sand and thin 1/8" calcine layers - low plasticity - greenish black - moist to wet	
25.0	7	GB			ALLUVIUM - Silty Sandy Cobbly GRAVEL (GM) - color varies - dense - saturated	
		GB			Clayey sandy cobbly gravel (GC) - fines moderately plastic - very dark gray 7.5YR 3/1 - predom. subangular with some subrounded	
30.0	8	GB			Transition to silt fines (GW-GM) - reddish brown 5YR 4/4	
		GB			Very dark gray 7.5YR 3/1 - becomes predom. subrounded	
					Lower fines content (<10%) (GW) - dark yellowish brown 10YR 4/6	
					Increased fines, approximately 15% (GW-GM) - yellowish brown 10YR 5/8 - medium dense	
35.0					34.5	
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT^2: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO: 60157757

SHEET NO: 1 OF 2

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-5D**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
				SURFACE ELEVATION +8,831.1 Feet (Continued)		
36.5	9	GB		36.5 ALLUVIUM - Gravelly Silty SAND (SM) - approximately 10% gravel, 15% silt and 75% sand - red 2.5YR 5/6 - wet - medium dense		
				End of Boring Boring logged by: A. Jewell Casing: 5.5" I.D. Boring completed as 2.0" diameter monitoring well: 0.010" PVC screen 11.0-21.0' with bottom plug and sand pack 10.0-21.0' - 11.0' SCH 40PVC riser with flush mounted cover.	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING 1388375	BORING STARTED 10/9/11	AECOM OFFICE Denver	
EASTING 2267814	BORING COMPLETED 10/9/11	ENTERED BY SJH	SHEET NO 2 OF 2
WL 15.5' WD	RIG/FOREMAN MINI-SONIC C100/D. Cervantes	APP'D BY EED	AECOM JOB NO 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-5S**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,831.1 Feet		
					No logging - No sampling See MW-5D		
5.0							
10.0							
15.0							
20.0							
22.0					22.0		
					Boring completed as 2.0" diameter monitoring well. Total depth 22.0' - 0.010" PVC screen 11.0-21.0' with bottom plug and sand pack 10.0-22.0' - 11.0' SCH 40 PVC riser with flush mounted cover.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1388370**	BORING STARTED: **10/9/11**	AECOM OFFICE: **Denver**	
EASTING: **2267814**	BORING COMPLETED: **10/10/11**	ENTERED BY: **SJH**	SHEET NO.: **1** OF **1**
WL	RIG/FOREMAN: **MINI-SONIC C100/D. Cerventes**	APP'D BY: **EED**	AECOM JOB NO: **60157757**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-6D**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,830.6 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL
		GB			FILL - Dike - altered wasterock, Silty Cobbly Sandy GRAVEL (GW-GM) - approximately 45% gravel and cobbles, 40% sand and 15% silt - cobble to 4.0" or larger - predom subangular - strong brown 7.5YR 5/6 - medium dense - slightly moist
	1	GB			
3.5					0.0-0.66' - Highly altered wasterock - rock matrix evident - clays residual include greenish gray, yellow 5YR 8/6 and white
5.0		GB			FILL - Dike - Clayey Cobbly Sandy GRAVEL (GC) - approximately 40% gravel and cobbles, 40% sand and 20% clay fines - cobbles to 4.0" or larger - predom. subangular to angular - dark brown 7.5YR 3/3 - dense to medium dense - moist - highly plastic clay fines - various colors, dark reddish brown 2.5YR 3/4 and dark brown 10YR 2/2
	2	GB			
		GB			
	3	GB			
10.0		GB			Cobbly layer - cobbles to 5.0" or larger, subround to subangular at 9.5-10.0'
	4	GB			
		GB			
	5	GB			Cobbly layer - cobbles to 3.0" or larger, subangular at 13.0-13.5' - extremely dense
15.0		GB			Possible colluvium from 13.0-17.0'
	6	GB			13.5' - Changes to silt fines - approximately 15% fines - brown 7.5YR 4/2 - very cobbly (GW-GM)
		GB			15.0' - Becomes dark reddish brown 2.5YR 3/4 - gap graded - approximately 5% fines, 5% sand and rest gravel and cobbles - cobbles to 5.0" or larger (GP)
17.5	7	GB			Significant increase in clay fines to 20% and tree stems to 3/8" relatively undecayed from 16.5-17.5' (GC)
20.0		GB			ALLUVIUM - Organic SILT (ML-OL) - decayed plant matter - scattered gravel to 1.0" or larger - medium dense - moist
	8	GB			18.0' - Significant increase in gravels - subangular to angular - up to 30% gravels - gap graded - decayed plant matter
		GB			COLLUVIUM - Silty Sandy GRAVEL (GM) to 2.0" or larger - predom. angular to subangular - very dark gray 7.5YR 3/1 - extremely dense - slightly moist
24.0					
25.0	9	GB			ALLUVIUM - Clayey Gravelly Cobbly SAND (SC) - approximately 40% sand, 30% cobbles and gravel and 30% moderately plastic clay - cobbles to 6.0" or larger - predom. subangular to angular - dark gray 7.5YR 4/1 - dense - wet
28.5		GB			
30.0					

UNIT DRY WT LBS./FT³

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

12 31 14 24 42 50/4" 25 50/5" 31 35

... continued

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 1 OF 2

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM	CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **MW-6D**
	PROJECT NAME: **Rico-Argentine Site - OU01**	ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,830.6 Feet (Continued)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL
	10	GB			ALLUVIUM - Clayey Gravelly Cobbly SAND (SC) - approximately 40% sand, 30% cobbles and gravel and 30% moderately plastic clay - cobbles to 6.0" or larger - predom. subrounded to angular - dark gray 7.5YR 4/1 - dense - wet
		GB			31.5' - Becomes Silty Sandy GRAVEL (GW) - approx. 60% gravel, 30% sand and 10% fines - predom. subrounded to subangular - dark brown
35.0					Becomes strong brown 7.5YR 4/6 at 34.0'
	11	GB			
					36.5 ALLUVIUM - Silty fine SAND (SP) - <5% silt - medium grain sand - dark yellowish brown 10YR 4/4 - wet
		GB			37.5 ALLUVIUM - Sandy GRAVEL (GW) - subangular to subrounded - approximately 60% gravel, 40% sand and <3% silt - gravel to 3.0" - well graded - subangular to subrounded - wet
40.0					39.5
	12	GB			Core sample from 37.5-40.0' is probably loosened, mixed and sorted due to multiple attempts to clean hole (flapper bit)
41.5					41.5 ALLUVIUM - Silty fine SAND (SM) - up to 20% silt - low plastic fines - strong brown 2.5YR 3/4 - loose
					Becomes dark reddish brown 12.5YR 3/4 at 41.0'
					End of Boring
					Boring logged by: A. Jewell
					Casing: 5.5" I.D.
					Boring completed as 2.0" diameter monitoring well: 0.010" PVC screen 30.0-40.0' with bottom plug and sand pack 29.0-41.5' - 30.0' SCH 40PVC riser with flush mounted cover.

UNIT DRY WT LBS./FT.^{3}

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1388166**	BORING STARTED: **10/11/11**	AECOM OFFICE: **Denver**		
EASTING: **2268148**	BORING COMPLETED: **10/11/11**	ENTERED BY: **SJH**	SHEET NO: **2** OF **2**	
WL: **23.75' WD**	RIG/FOREMAN: **MINI-SONIC C100/D. Cervantes**	APP'D BY: **EED**	AECOM JOB NO: **60157757**	

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-6S**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,830.7 Feet		
					No logging - No sampling		
					See MW-6D		
5.0							
10.0							
15.0							
20.0							
25.0							
28.0							

Boring completed as 2.0" diameter monitoring well:
Total depth 28.0' - 0.010" PVC screen 17.0-27.0' with bottom plug and sand pack 16.0-28.0' - 17.0' SCH 40 PVC riser with flush mounted cover.

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388166	BORING STARTED: 10/11/11	AECOM OFFICE: Denver	
EASTING: 2268153	BORING COMPLETED: 10/11/11	ENTERED BY: SJH	SHEET NO: 1 OF 1
WL	RIG/FOREMAN: MINI-SONIC C100/D. Cervantes	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **MW-102**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,841.3 Feet		
					Note: Offset boring 75' NNE from SSR-102 No soil samples obtained		
5.0							
10.0							
15.0							
20.0							
25.0							
30.0							
					. . . continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 2

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **MW-102**
PROJECT NAME: **Rico - Argentine Mine Site**	ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,841.3 Feet (Continued)	
					Note: Offset boring 75' NNE from SSR-102 No soil samples obtained	
32.0				32.0	Blank drilled with 4-1/4" ID HSA to 32 feet with wood plug in lead end of 4 1/4" ID HSA. Piezometer installed in borehole with tip at 31 feet. No soil samples obtained.	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1388482.836**	BORING STARTED: **11/11/12**	AECOM OFFICE: **Denver**	
EASTING: **2268230.492**	BORING COMPLETED: **11/12/12**	ENTERED BY: **DCJ**	SHEET NO.: **2** OF **2**
WL: **W.L. @ 23.5'**	RIG/FOREMAN: **CME-85/Reggie Castro**	APP'D BY:	AECOM JOB NO.: **60239818**

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: MW-202

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

DEPTH(FT)	ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
						SURFACE ELEVATION +8,859.2 Feet	
		1	SON			FILL: Well graded gravel, some sand, little silt - 57% gravel, 30% sand, 13% fines - 10YR3/2 - (FILL: GM)	
						2.0 Clayey sand and gravel, some silt - 35% gravel, 40% fine to coarse sand, 25% fines - 7.5YR4/3 (SC)	
5.0		2,3	SON				
						6.0 Well graded clayey gravel and sand, little silt - 7/5YR4/3 (GW-GC)	
						9.0	
10.0		3,4	SON			Clayey sand and gravel, some silt - 35% gravel, 40% fine to coarse sand, 25% fines - 7.5YR4/3 (SC)	
						13.0 Well graded sand, some gravel, little silt - 20% gravel, 71% fine to coarse sand, 9.3% silt - 10YR4/3 (SW-SM)	
15.0		5	SON				
20.0		6	SON				
						23.5 Well graded sand, some gravel, little silt - 20% gravel, 71% fine to coarse sand, 9.3% silt - 10YR4/4 (SW-SM)	
25.0		7	SON				
30.0							

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1, 2, 3, 4, 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10, 20, 30, 40, 50)

STANDARD PENETRATION BLOWS/(FT) (10, 20, 30, 40, 50)

. . . continued

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 2

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM	CLIENT: Atlantic Richfield Company	LOG OF BORING NUMBER: MW-202 DRAFT
	PROJECT NAME: Rico - Argentine Mine Site	ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,859.2 Feet (Continued)		
	8	SON			Well graded sand, some gravel, little silt - 20% gravel, 71% fine to coarse sand, 9.3% silt - 10YR4/4 (SW-SM)		
35.0					35.5		
		RB			Blind Drilling		
38.8					38.8		
					End of boring at 38.8 ft. Boring advanced to 35.5 feet with sonic drilling techniques, boring advanced to 38.8 feet using mud rotary techniques. Piezometer installed with tip at 38.8 feet.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388999.649	BORING STARTED: 11/8/12	AECOM OFFICE: Denver	
EASTING: 2268195.978	BORING COMPLETED: 11/11/12	ENTERED BY: AMH	SHEET NO.: 2 OF 2
WL: W.L. @ 22.5' W.D.	RIG/FOREMAN: AMS Compact Sonic 10-C/Kyle King	APP'D BY:	AECOM JOB NO.: 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR1**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,861.5 Feet

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT^3
	1	SS			FILL - Silty GRAVEL (GM) - angular rock fragments to 5" minus - moist - brown (waste rock)	
		PA				
5.0					5.5	
	2	SS			Clayey SILT with trace coarse to fine Sand and Gravel 3" minus (ML) - dense - moist - brown	
		PA				
					9.5	
10.0					Silty GRAVEL (GM) - subrounded 3" minus - dry - medium dense - gray	
	3	SS				
					12.0 Same with increasing clay	
		PA			Silty CLAY (CL) - with trace angular gravel fragments to 1" minus and cobbles 4" minus - extremely dense to medium dense - moist	
15.0						
	4	SS			>50 blows 6-12" at 15.5' (cobble in CL)	
		PA				
					Decrease angular and subrounded gravel cobble size	
20.0						
	5	SS			Increase in angular gravel fragments	
					21.5	
		PA			Very Silty GRAVEL (GM) - angular and subrounded up to 2-3" minus - moist - brown	
25.0					25.0	
	6	SS			25.5 Silty CLAY, trace pebble Gravel and Sand (CL) - extremely dense - moist - brown	
					>50 blows 0-6" at 25.0' (cobbles)	
		PA			Very Silty GRAVEL (GM) - angular - cobbles 4" minus - moist - brown	
					29.5	
30.0						

43

19

>100/12"

17

>50/6"

continued

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 1 OF 3

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR1**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,861.5 Feet (Continued)		
	7	SS			31.0 Clayey GRAVEL (GC) - angular to subrounded cobbles 6" minus - medium dense - moist - brown		14
					31.5 0.5' section of Sandy CLAY (SC)		
		PA			Silty GRAVEL (GM) - mostly angular 2" minus - very dense - moist - wet at 34 0'		
35.0							>74/12"
	8	SS			36.5 Loose and flowing at 36 0-37.0'		
		PA			Well graded GRAVEL, trace Silt (GW) - mostly subangular 2" minus - extremely dense - wet - dark brown		
					Increasing silt		
40.0							>96/12"
	9	SS			Less gravel, more silt, with trace clay - subrounded 3" minus		
					42.0 Clayey GRAVEL (GC) - subrounded cobbles 5" minus - wet but much less water		
		PA					
45.0					45.0 45.0' - Changing sampling interval so that casing can be at TD of hole rather than 2 feet above TD		
					Well graded GRAVEL with Silt (GW) - subrounded cobbles up to 6" minus - striated cobbles - extremely dense - wet		>99/12"
	10	SS					
50.0		PA					
					51.0 Poorly sorted SAND (SP), fine grained Sand - wet		
					52.0		76
	11	SS			52.5 Well graded SAND (SW), fine to coarse size - very dense - wet		
					53.5 Well graded GRAVEL (GW) - up to 1" minus - wet		
					54.0 Clayey GRAVEL (GC) - 1" minus gravel - wet - well rounded		
55.0		PA			55.5 Gravelly CLAY (GC) - wet - below boulder		
					Clayey GRAVEL (GC) - angular and subrounded cobbles - extremely dense - wet		50/6"
					57.5		
	12	SS			Silty GRAVEL (GM) - mostly angular and subangular 3-4" minus - moist		
60.0							
					... continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO: **60157757**

SHEET NO: **2** OF **3**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR1**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT³
					SURFACE ELEVATION +8,861.5 Feet (Continued)	
		PA			60.5 Poorly sorted SAND (SP) - fine grained	
					61.5	
62.0					62.0 Well sorted GRAVEL (GW)	
					End of Boring Boring logged by: L. Beem Casing: 7.0" I.D.	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT) — 10 20 30 40 50

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1389436	BORING STARTED: 10/3/11	AECOM OFFICE: Denver	
EASTING: 2268299	BORING COMPLETED: 10/4/11	ENTERED BY: SJH	SHEET NO: 3 OF 3
WL: 34.0' WD	RIG/FOREMAN: SONIC C600/	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR2**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,845 8 Feet		
	1	SS			FILL - Silty GRAVEL (GM) - extremely dense - moist - grayish - angular - reworked laydown yard gravel and mine waste rock		
		PA					
5.0							
	2	SS					>64/12"
		PA			Boulders		
					8.0 Clayey SILT with trace coarse sand size rock fragments (ML) - moist - brown		
10.0					10.0		
	3	SS			Silty CLAY with trace pebble Gravel (CL) - moist - brown		5
					11.0		
					11.5 Poorly sorted fine to medium SAND (SP) - moist		
		PA			Silty SAND with trace pebble Gravel (SM)		
					12.5 Silty CLAY (CL) - moist - brown		
					14.0		
15.0					Silty GRAVEL (GM) - angular to subrounded cobbles up to 7" - very dense to extremely dense - dry - gray-brown		
	4	SS			>50 blows 6-12" at 15.5'		74
		PA					
20.0							
	5	SS			>50 blows 0-6" at 20.0'		>50/6"
					Increasing silt - wet at 21.0'		
		PA					
					Increasing clay - wet		
25.0							
	6	SS			25.5 No SPT at 25.0' - boulders/cobbles		
					Well sorted GRAVEL, up to 2" diameter, with Silt (GW) - red-brown		
		PA			28.0 Clayey GRAVEL (GC) - cobbles increase to 5-6" diameter - wet - red-brown		
30.0					Clay at 29.0-30 0'		
					30.0		
					..... continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO: **60157757**

SHEET NO: **1** OF **4**

AECOM LOG 60157757 GPJ FS_DATATEMPLATE GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: NSR2

PROJECT NAME: Rico-Argentine Site - OU01

ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³
					SURFACE ELEVATION +8,845.8 Feet (Continued)	
	7	SS			*NOTE: Yellow stain zone near 30.0'. Same as gravels stained from mine tunnel water.	
					31.5 Silty GRAVEL (GM), slight flow of fines - very dense - wet to saturated - gray	
					32.0 Clayey GRAVEL (GC), core intact with smaller angular gravel 1.5" minus - wet - gray	
		PA			Silty GRAVEL (GM), slight flow of fines - extremely dense - wet to saturated - gray	
35.0						
	8	SS			36.0' - Color changes to red-brown	
		PA			Increasing clay - cobbles up to 6" in diameter - angular - red-brown 2" minus gravel - core intact	
40.0						
	9	SS			41.0 Well sorted GRAVEL (GW), mostly subrounded cobbles up to 5" in diameter - wet - saturated - red-brown	
		PA				
45.0						
	10	SS			No SPT at 45.0' flowing gravels	
		PA			Most of core was water - gravel, cobbles up to 4-5" in diameter No SPT - flowing sands into hole	
50.0					50.0	
	11	SS			Poorly sorted SAND with trace pebble size Gravel (SP) - wet - brown	
		PA			52.0 Well sorted GRAVEL, pebble size Gravel, increasing coarse Sand size with depth (GW) - wet - brown	
55.0					55.0 No SPT at 55.0' - flowing sands	
	12	SS			Poorly sorted SAND (SP), fine grained sand - wet saturated	
		PA			57.0 Well sorted SAND, with trace pebble size Gravel, fine to coarse Sand (SW) - wet	
					58.5 Silty GRAVEL, with trace Clay near 60.0', subrounded up to 2" in diameter (GM) - wet - brown	
60.0					60.0	
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

⊗5

⊗87

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 2 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: NSR2

PROJECT NAME: Rico-Argentine Site - OU01

ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT³
					SURFACE ELEVATION +8,845.8 Feet (Continued)	
	13	SS			Poorly sorted SAND (SP), fine grained Sand - medium dense - wet - brown - saturated	
					62.0	
		PA			63.0 Well sorted SAND with trace pebble size Gravel, fine to coarse Sand (SW) - wet - brown - fine grains and deposits below 4" cobble	
					Silty GRAVEL (GM), pebble-cobble up to 4" minus - wet - brown	
65.0					65.0	
	14	SS			66.0 Poorly sorted SAND (SP), fine grained Sand - saturated - red-brown	
		PA			Silty GRAVEL, cobble up to 7" diameter (GM) - wet - brown	
	15	SS			67.5 Well graded SAND, fine to coarse grained Sand (SW) - fining upwards - wet - red-brown	
					69.5	
70.0		PA			Well graded GRAVEL (GW) - wet - red-brown	
					71.5 Color changes to gray-brown at 71.0'	
	16	SS			Poorly sorted SAND (SP), fine to medium grade - very dense - saturated - gray	
					73.0 Well graded SAND, trace pebble Gravel 2" minus (SW) - fining upwards - wet - red-brown	
					74.5	
75.0		PA			Silty GRAVEL (GM) - angular subrounded cobbles 4" minus with 2" gravel interbedded at 76.0' - wet - red-brown	
					>60 blows 12-18" at 76.0'	
					77.0	
	17	SS			Poorly sorted SAND (SP) - fining upwards - extremely dense - saturated - red-brown	
					79.5 Fine to medium sand	
80.0		PA			Well graded GRAVEL, mostly subrounded 3" minus (GW) - wet - red-brown	
					82.0	
	18	SS			83.0 Poorly graded SAND (SP), medium to fine grained - fining upwards - dense - saturated - red-brown	
					Well graded GRAVEL (GW), subrounded 2" minus - extremely dense - wet - red-brown to gray	
85.0		PA				
	19	SS			No recovery from 87.0-95.0' >50 blows 6-12" at 87.5'	
90.0						
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

20

73

118

48

>90/12"

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO. 60157757

SHEET NO 3 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR2**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT ^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,845.8 Feet (Continued)		
		PA			Well graded GRAVEL (GW), subrounded 2" minus - extremely dense - wet - red-brown to gray		
	20	SS			Had to clean hole to 87.0' then drill with 20.0' of core barrel to 100.0'. Only 95.0-100.0' is native undisturbed.		
95.0							
		PA					
100.0					100.0		
					End of Boring Backfilled with bentonite chips (25 bags) Boring logged by: L. Beem Casing: 7.0" I.D.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

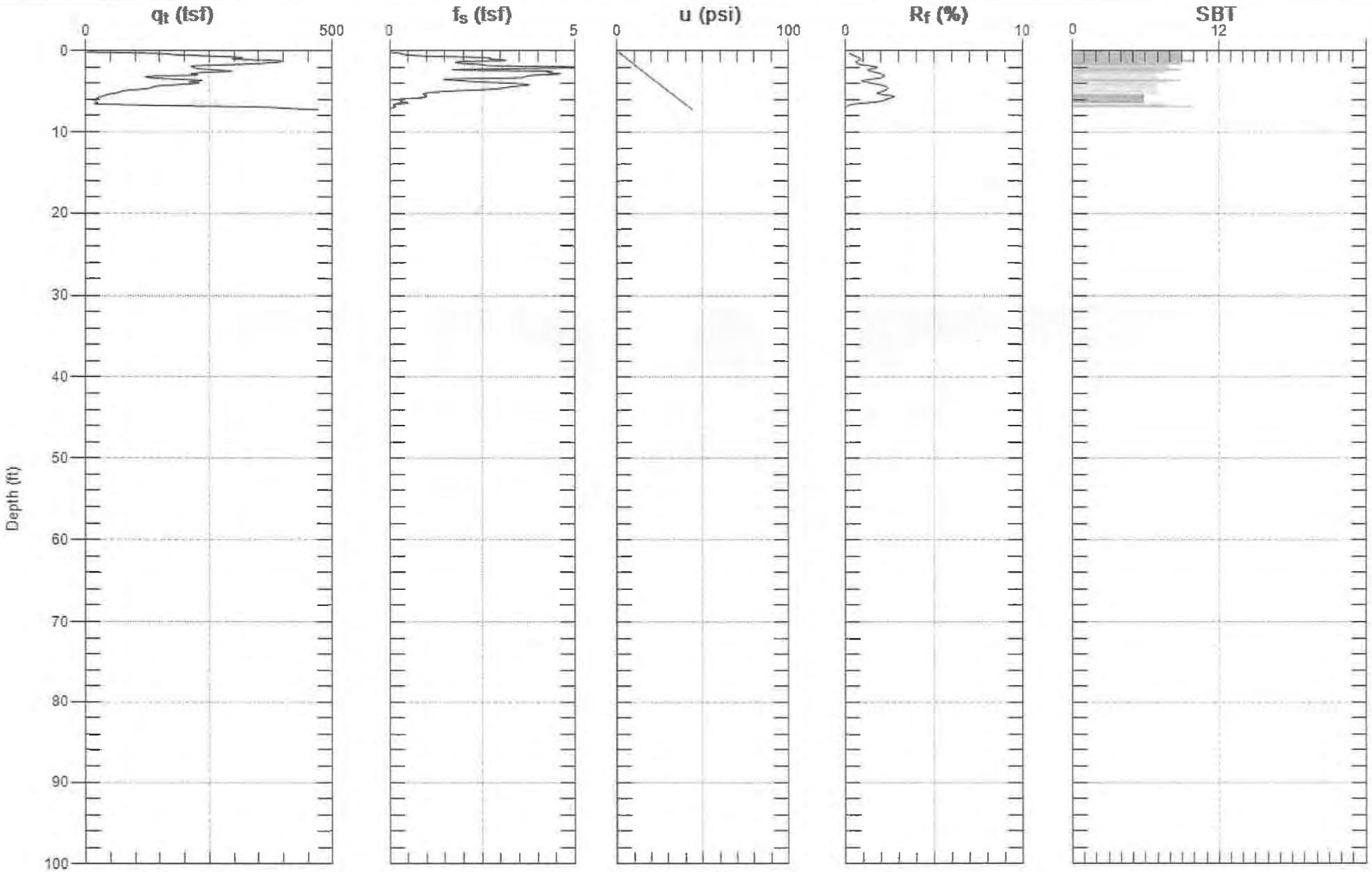
NORTHING: 1389459	BORING STARTED: 10/2/11	AECOM OFFICE: Denver	
EASTING: 2268095	BORING COMPLETED: 10/3/11	ENTERED BY: SJH	SHEET NO: 4 OF: 4
WL: 21.5-27.0' WD	RIG/FOREMAN: SONIC C600/	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

GREGG **AECI**

Site: RICO ST LUIS DRYING CE Engineer: C. SANCHEZ

Sounding: CPT-NSR-02 Date: 11/1/2011 03:00



Max. Depth: 7.218 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR3**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT 3
					SURFACE ELEVATION +8,854 0 Feet	
	1	SS			FILL - Silty GRAVEL (GM) - latite boulder rock fragments angular - moist - brown (mine waste)	
		PA				
5.0					5.0 Some clay from 4.0-5.0' No SPT at 5.0' because of cobbles/boulders	
	2	SS			FILL - Clayey GRAVEL (GC) - extremely dense - moist - tan then brown with depth (mine waste)	
		PA				
10.0					Backfill demolition debris at 9 0'	
	3	SS				
		PA			Sludge, black, wet, septic/wastewater odor - metal debris Clayey gravel - wet - yellow staining	
15.0					Rock fragments up to cobble size at 14.0'	
	4	SS			No SPT - demolition debris	
		PA			17.5 Clayey gravel with dolomite clasts cobble size - pyrite or dolomite - moist - gray changing to red	
					19.0 FILL - Sandy GRAVEL (GW) - moist - yellow and tan (possible staining noted on cobbles from mine tunnel water)	
20.0					20.0 FILL - Well sorted SAND (SP) with latite cobbles - moist - reddish tan	
	5	SS				
		PA			FILL - Clayey GRAVEL (GC), appears to be some calcine tailings - zone of galena deposits - extremely dense - very moist - red, yellow, brown (possible staining noted on cobbles from mine tunnel water) Latite boulders up to 7" in diameter Wet at 24.0' above latite boulder	
25.0					Latite boulder	
					26.0 ALLUVIUM - Silty GRAVEL (GM) - well rounded river cobbles, latite and hermosa sandstone - up to 6" diameter - extremely dense - wet	
	6	SS			>50 blows 0-6" at 26.0'	
		PA			29.0 Well graded GRAVEL (GW)	
30.0					30.0 Silty GRAVEL - wet - saturated - brown (GM)	
	7	SS			31.0	
					31.5 Well sorted SAND (SP), fine to medium grained - wet - salt and pepper color	
		PA			32.0 Silty CLAY (CL) - moist - brown (in SS shoe at 31.5')	
35.0					Silty GRAVEL (GM) - very dense to extremely dense - saturated - brown	
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT 2: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50

>50/6" >50/6" >50/6" 83 54

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 1 OF 2

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR3**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

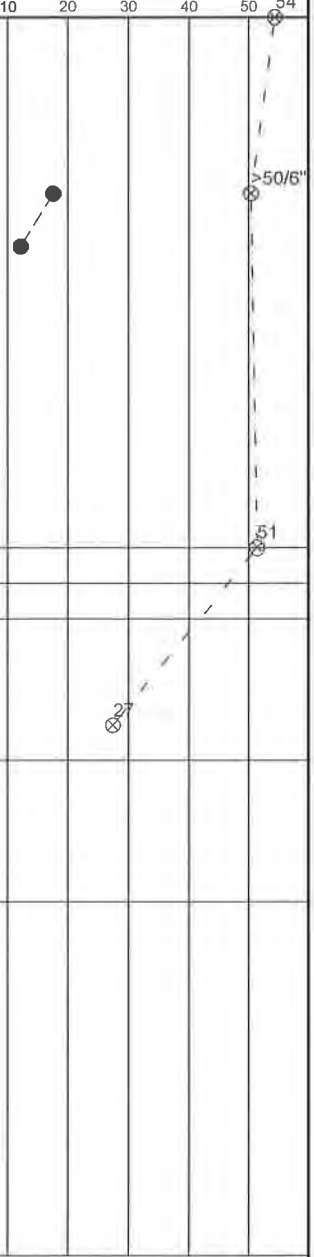
SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.³
					SURFACE ELEVATION +8,854.0 Feet (Continued)	
	8	SS			Silty GRAVEL (GM) - very dense to extremely dense - saturated - brown	
		PA				
40.0						
	9	SS			Trace clay - cobbles	
					43.0-44.0' - Increasing clay content	
45.0		PA			Decreasing clay, mostly silt - flowing - 8.0" cobbles	
					Increasing clay - wet to very moist, noticeably drier Small cobbles to pea gravel	
50.0					50.0	
	10	SS			Silty CLAY with fine to coarse Sand (CL) - moist	
					51.0 Poorly sorted SAND (SP) - fining upwards - wet (SP)	
					52.0	
		PA			Silty GRAVEL (GM) - SS cobbles to 6" diameter - medium dense - wet - red - trace clay at 52.0', then grades to silt to 55.0' Dolomite and red hermosa - SS cobble to 6.0" diameter	
55.0						
	11	SS			56.0	
		PA			Well graded GRAVEL to 3" diameter (GW) - coarse sand - saturated	
60.0					60.0	
					End of Boring Hole sealed with bentonite (24 bags) Boring logged by: L. Beem Casing: 7.0" I.D.	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING	1389791	BORING STARTED	9/29/11	AECOM OFFICE	Denver
EASTING	2268136	BORING COMPLETED	9/30/11	ENTERED BY: SJH	SHEET NO 2 OF 2
WL	24.0' WD	RIG/FOREMAN	SONIC C600/	APP'D BY: EED	AECOM JOB NO 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR4**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,868 4 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS /FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
	1	SS			Silty GRAVEL (GM) with trace Clay and angular to subrounded cobbles 7" minus - medium dense - moist - tan and gray - possible landslide debris		
		PA					
5.0							
	2	SS					15
		PA					
					9.0 DOLOMITE boulder from 7.0-10.0'		
					9.5 POSSIBLE LANDSLIDE DEBRIS - Clayey SILT (ML) with trace pebble Gravel - moist - light brown		
10.0							
	3	SS			POSSIBLE LANDSLIDE DEBRIS - Clayey GRAVEL (GC) - angular and subrounded cobbles 5" minus - extremely dense - moist - tan		>80/12"
		PA					
					14.0 POSSIBLE LANDSLIDE DEBRIS - Silty GRAVEL (GM) with cobble, subrounded and angular rock fragments - very dense to extremely dense (loose below 25.0') - moist - dark brown		
15.0					DOLOMITE boulder with Pyrite vein		
	4	SS					74
		PA					
20.0							
	5	SS					97
		PA			Numerous boulders Changes in matrix color because of different cobbles and boulders		
25.0							
	6	SS					6
					26.5 POSSIBLE LANDSLIDE DEBRIS - Silty CLAY (CL) with pebble size subrounded Gravel - wet		
		PA			28.0 POSSIBLE BOTTOM OF LANDSLIDE DEBRIS - Silty GRAVEL (GM) with trace Clay at 28.0' then changing to all Silt - wet - contact with CL below at approximately 15		
30.0					29.5		
					... continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 1 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR4**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³
					SURFACE ELEVATION +8,868 4 Feet (Continued)	
					degrees -	
	7	SS			ALLUVIUM - Silty CLAY (CL) trace coarse Gravel and angular pebble Gravel - core in tact - very moist - brown-red - massive	
		PA			Angular to subangular rock fragments - latite	
35.0						
	8	SS			>50 for 0-6" at 35.0'	
					36.0 Silty GRAVEL (GM) with trace Clay - angular cobbles 6" diameter, drilled through boulders - wet - red-brown	
		PA				
40.0					40.0 Getting drier to 40.0'	
	9	SS			Clayey GRAVEL (GC) with boulders and angular fragments up to 3" diameter - extremely dense - wet - brown-red	
					43.0	
		PA			Silty GRAVEL (GM), with trace Clay - first notice of well rounded river cobbles - 4.5" minus - very dense to extremely dense - wet - red-brown Yellow precipitate zone from 43.0-44.0' - drier, very moist	
45.0						
	10	SS				
		PA				
50.0						
	11	SS			>50 blows 6-12" at 50.5'	
					52.0 Poorly sorted sand sized pebble subrounded gravel - wet - red-brown (SP)	
		PA			53.5 Silty GRAVEL (GM) with trace Clay, trace cobbles 4" minus - extremely dense - wet - red-brown	
55.0						
	12	SS				
					56.5 Well sorted GRAVEL (GW) with trace Silt - 4" minus subrounded cobbles - wet - red-brown - groundwater producing zone	
		PA			58.0 Clayey GRAVEL (GC) with some Silt - 4-5" minus subround cobbles - dense - very moist - red-brown - noticeably drier to 60.0'	
60.0						
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

5 >50/6" >50/6" 49 109 >50/6" 40

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60157757 | SHEET NO. 2 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR4**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT³
					SURFACE ELEVATION +8,868.4 Feet (Continued)	
					60.5	
	13	SS			Silty GRAVEL (GM) with trace Clay, fine to coarse Sand, pebble Gravel, rounded cobbles - extremely dense - wet - red-brown	
		PA				
65.0					Changed sample interval to 62.0' and then every 5.0' to keep casing at TD of hole	
					Cobble in shoe	
	14	SS				
					69.0	
70.0		PA			Clayey GRAVEL (GC) - subrounded cobbles to 5" minus - very moist - increasingly wet with depth	
					71.5	
	15	SS			Well graded GRAVEL (GW) with trace Clay - pebble gravel, 3" minus - extremely dense - wet	
					74.0	
75.0		PA			Well sorted SAND (SW) with trace small pebble Gravel - wet	
					75.5	
					Silty GRAVEL (GM) with trace Clay - more angular gravel 3" minus - very dense - wet - red-brown	
	16	SS				
					77.5	
					Well graded GRAVEL (GW), trace Silt - silt increasing with depth - wet - light gray	
					79.5	
80.0					Silty GRAVEL (GM), trace Clay, angular to subangular cobbles 4" minus - very moist	
		PA			Hermosa boulder at 82.0' (2.0' thick)	
85.0					Increasing clay Most rock fragments are lower hermosa arkose and dolomite	
					Angular cobbles and small boulders, hermosa arkose - increasing clay content - moist - light gray	
	17	SS				
		PA				
90.0					90.0	
					continued	

STANDARD PENETRATION BLOWS/(FT): >50/6" (at 65.0'); 82 (at 70.0'); 60 (at 75.0'); >50/6" (at 85.0')

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO: **60157757**

SHEET NO: **3** OF **4**

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **NSR4**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,868.4 Feet (Continued)		
					DOLOMITE, fractured, Clay in fractures, light gray		
					Light gray crystalline DOLOMITE		
					Void 92.0-94.0' - drill stem dropped		
95.0					Fractured DOLOMITE and Clay (possible failure plane)		
					DOLOMITE heavily fractured with Clay infill - not re-cemented (possible landslide fracture plane)		
100.0					100.0 DOLOMITE core fractured by sonic drill		
					End of Boring Boring logged by: L. Beem Casing: 7.0" I.D.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1389778	BORING STARTED: 9/27/11	AECOM OFFICE: Denver	
EASTING: 2268243	BORING COMPLETED: 9/28/11	ENTERED BY: SJH	SHEET NO: 4 OF 4
WL: 26.5' WD	RIG/FOREMAN: SONIC C600/	APP'D BY: EED	AECOM JOB NO.: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: PDF-1

PROJECT NAME: Rico-Argentine Site - OU01

ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

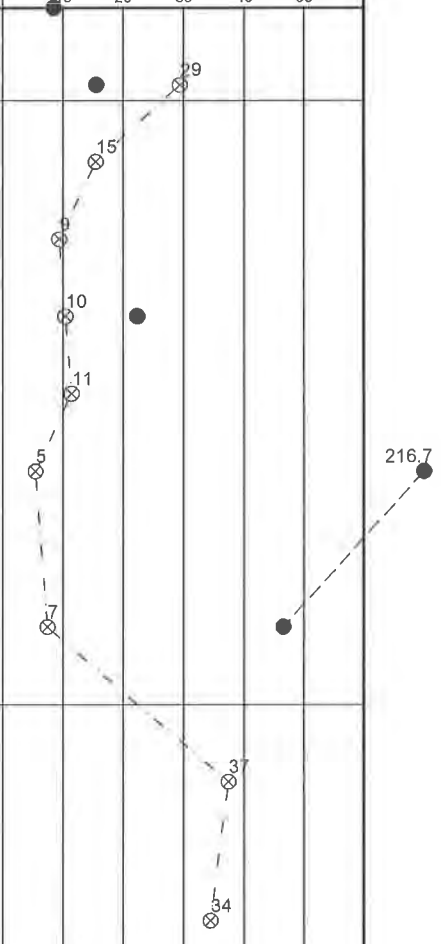
SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³
					SURFACE ELEVATION +8,831.6 Feet	
		GB			PDF DIKE FILL - Silty Sandy GRAVEL (GW) - subrounded to rounded - medium dense - moist	
					3.0	
	1	GB			FILL - Calcines - Silty fine SAND (SM), sized est. <10% silt - reddish purple (no munsell color) - moist - medium dense to loose	
5.0		GB				
	2	GB				
		GB				
	3	GB				
10.0		GB				
	4	GB				
		GB				
	5	GB				
15.0		GB			Becoming wet at 14.5'	
	6	GB				
		GB				
20.0						
	7	GB				
					22.5	
		GB			ALLUVIUM - Silty Sandy Cobbly GRAVEL (GW) - approximately 5% cobbles to 4.5", 55% gravel, 30% sand and 10% silt fines - predom. subrounded to well-rounded gravel - bluish black 2 GLEY 2.5/5PB- black color does not appear to be organic, rather appears to be chem related to calcines - dense - wet	
25.0	8	GB			25.0-30.5' - Core sample appears to contain calcines from above - using water to prevent heaving in drill casing - sampling alluvial material only	
		GB				
30.0	9	GB			Becomes dark olive green 5Y 3/2	
		GB			32.0 Mix of units from 22.5-30.0' and 32.0'+	
		GB			ALLUVIUM - Gravelly Silty SAND (SW) - subrounded to rounded gravels - gravels up to 1.5" - strong brown 7.5YR 5/8 - wet	
35.0					35.0': Becomes dark yellowish brown 10YR 4/6	
		GB				
40.0						
					... continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO. 60157757

SHEET NO. 1 OF 3

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: PDF-1

PROJECT NAME: Rico-Argentine Site - OU01

ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,831.6 Feet (Continued)		
					ALLUVIUM - Gravelly Silty SAND (SW) - subrounded to rounded gravels - gravels up to 1.5" - strong brown 7.5YR 5/8 - wet		
		GB			40.0': Dark yellowish brown 10YR 4/6		
45.0							
		GB			Mostly fine sand, gravels reduce to <5%, approximately 5% silt - yellowish red 5YR 4/6 (SP)		
					Grades to silty fine sand with approximately 10% silt fines - reddish brown 2.5YR 4/8 (SP-SM)		
50.0							
					Subangular to subrounded, medium and coarse sands - fines <5% (SP)		
55.0		GB			Transitions back to silty fine sand - approximately 10% fines (SP-SM)		
60.0							
		GB					
65.0							
					68.0		
		GB			Fine Sandy CLAY (CL) - dark reddish gray 2.5YR 4/1 - moderately plastic - moist		
70.0					70.0		
					Transitions to Silty fine SAND (SP) - weak red 2.5YR 4/2 - approximately <5% fines		
75.0		GB			Transitions to reddish brown 2.5YR 4/3		
80.0							
					continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 2 OF 3

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **PDF-1**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,831.6 Feet (Continued)		
85.0		GB			Transitions to Silty fine SAND (SP) - weak red 2.5YR 4/2 - approximately <5% fines		
90.0		GB					
					92.0 Silty fine SAND (SM) - predom. approximately 15% silt with 6.0" layer at 93.0' and 99.0' of 25% silt and dark reddish gray 2.5YR 4/1 - generally reddish brown 2.5YR 4/3		
95.0		GB					
100.0					100.0 End of Boring Backfilled with bentonite (19 bags) Boring logged by: A. Jewell Casing: 5.5" I.D. No water available - frozen pump		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING **1388479**	BORING STARTED **10/6/11**	AECOM OFFICE **Denver**	
EASTING **2267812**	BORING COMPLETED **10/6/11**	ENTERED BY **SJH**	SHEET NO **3** OF **3**
WL **14.5' WD**	RIG/FOREMAN **MINI-SONIC C100/**	APP'D BY **EED**	AECOM JOB NO **60157757**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **PDF-2**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

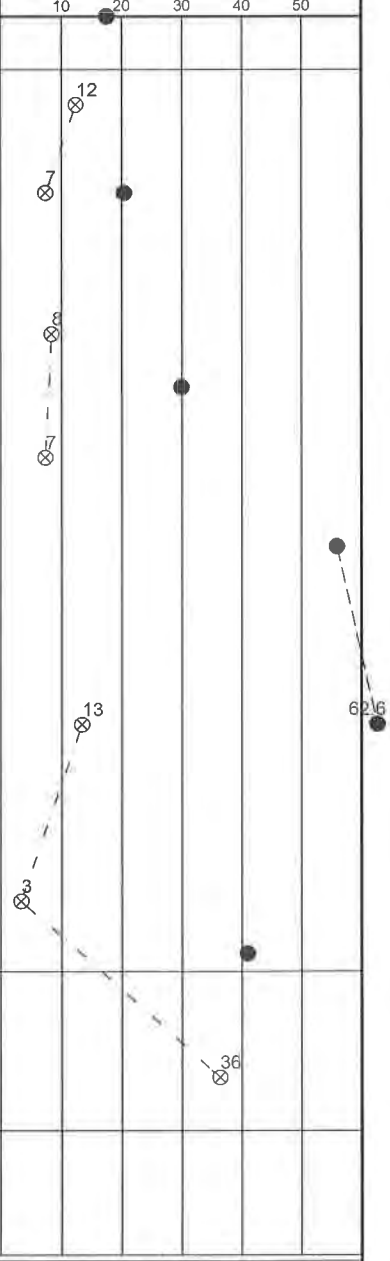
SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³
					SURFACE ELEVATION +8,838.9 Feet	
		GB			FILL - Wasterock/colluvium intermixed with calcines - COLLUVIUM FRACTION - Clayey Gravelly SAND (SP-SM) - gravels to 2.0" or larger - subangular - reddish purple (no munsell)	
1.5						
	1	GB			CALCINES - Silty fine SAND (SM) sized - black - medium dense to very dense - slightly moist to moist Alternating colors from black to reddish purple - color changes do not appear to be in clearly defined layers	
5.0		GB				
	2	GB				
	3	ST			Becoming coarse grained at 6.5'	
10.0	4	GB				
		GB				
	5	GB				
15.0		GB				
	6	ST				
		GB			Becoming wet at 18.0'	
20.0						
	7	GB			Becoming slightly coarser grained	
		GB				
25.0						
	8	GB				
27.0						
		GB			ALLUVIUM OR CALCINE/ALLUVIUM MIX - Silty Sandy Cobbly GRAVEL (GW-GM) - approximately 50% gravel 35 % sand and 15% silt fines - cobbles to 3.0" or larger - subrounded to subangular - reddish purple color of calcines to approx. 28.0' - dense - becoming alluvium at approx. 28.0' very dark gray - wet	
30.0						
	9	GB				
31.5						
					End of Boring Backfilled with bentonite (13 bags) Boring logged by: A. Jewell Casing: 5.5" I.D.	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING	1388696	BORING STARTED	10/10/11	AECOM OFFICE	Denver
EASTING	2267862	BORING COMPLETED	10/10/11	ENTERED BY: SJH	SHEET NO 1 OF 1
WL	18.0' WD	RIG/FOREMAN	MINI-SONIC C100/D. Cervantes	APP'D BY: EED	AECOM JOB NO 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: PDF-3

PROJECT NAME: Rico-Argentine Site - OU01

ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

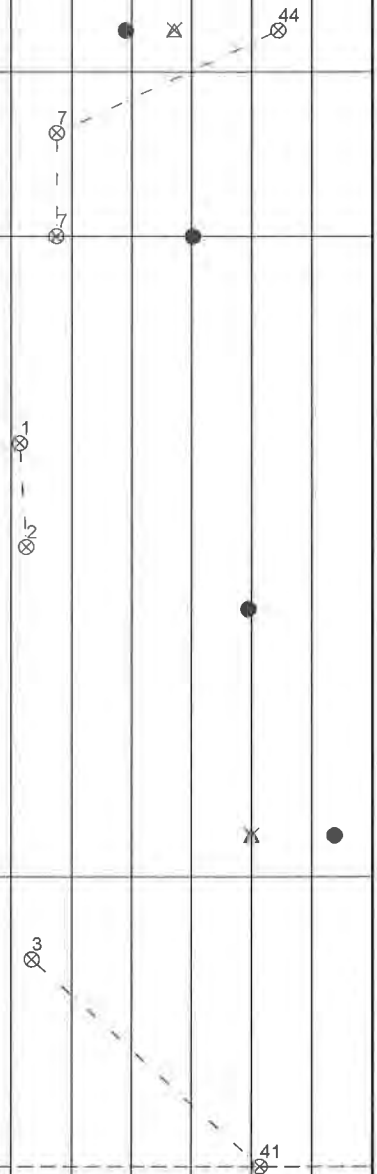
SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³
					SURFACE ELEVATION +8,830.8 Feet	
		GB			PDF EMBANKMENT FILL - Silty Sandy GRAVEL (GW) - approximately 50% gravel, 40% sand and 5-10% silt - subrounded to subangular - some scattered clumps with moderate plasticity	
	1	GB			3.5	
5.0		GB			FILL - Cobbly Sandy Clayey GRAVEL (GC) - man made debris - approximately 40% sand, 40% gravel and 20% fines - cobbles to 4.0" - dark reddish brown 5YR 3/3 - loose	
	2	GB			Clumps with up to 40% clay at 6.0-6.5'	
		GB			7.5 Becomes mixed with calcines at 7.0'	
	3	ST			FILL - CALCINES - fine sand and silt sized (SM) - approximately 10% fines - reddish purple (no munsell color) - very loose	
10.0					8.0-8.5' - Wet saturated layer - up to 30% silt - low plasticity	
	4	GB			General increase in silt content similar to 8.0-8.5' at 10-12.5'	
		GB				
	5	GB			No representative core sample due to hole cave	
		GB				
15.0						
	6	GB				
		GB			Attempted shelby tube - no recovery - hit rock at 24.0'	
20.0						
	7	ST			Attempted shelby tube - no recovery - moving to SPT at 25.0'	
					Core bag ripped - no recovery from 20.0-22.5'	
		GB			23.0 ALLUVIUM - Organic Silty SAND (ML-OL) - decayed plant fibers - some medium to coarse angular sand layers - organic smell - very loose to dense - wet	
25.0						
	8	GB			No core recovery from 25.0-30.0'	
		GB				
30.0						
					... continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO 60157757

SHEET NO 1 OF 2

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **PDF-3**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,830.8 Feet (Continued)		
31.5	9	GB			31.5 Possible silty sandy cobbly gravel alluvium contact at 31.0' - inferred rock - no rock in tip		
					End of Boring Backfilled with bentonite (8 bags) Boring logged by: A. Jewell Casing: 5.5" I.D.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING 1388223	BORING STARTED 10/10/11	AECOM OFFICE Denver	
EASTING 2268083	BORING COMPLETED 10/10/11	ENTERED BY SJH	SHEET NO 2 OF 2
WL 14.0' WD	RIG/FOREMAN MINI-SONIC C100/D. Cervantes	APP'D BY EED	AECOM JOB NO 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-101**

LOG STATUS: **DRAFT**

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

SURFACE ELEVATION +8,808.7 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
		RB			Class A 3" Fill causeway	
					3.5	
					3.6 Orange-brown solids	102 *
5.0	1	ST			Calcine Red brown 5.0 Change on shelby tube estimated at 5'	
					6.0 Silt with clay, non-cohesive, non-plastic - dark olive gray 5Y3/2 - very soft - wet (ML)	
	2	ST			Partly organic silt with very fine sand, non-cohesive, non-plastic - 20% very fine rounded sand - very loose/very soft - wet (ML)	76 *
		RB				
10.0					10.0	
	3	SS			10.5 Organic silt, non-plastic, non-cohesive, trace fine roots	2/6"
	3A	SS			11.0 and plant material fragments - black 5Y2.5/1 - very soft - wet (OL)	1/12" *
		RB			Partly organic sandy silt - 4% fine gravel, 22% fine to coarse rounded to subrounded sand, 74% silt/clay - black 5Y2.5/1 - very loose - wet (ML) (LOI = 2.18%)	
	5	SS			14.0 Organic silt, non-plastic, non-cohesive, trace fine roots	50/1"
15.0					14.1 and plant material - black 5Y2.5/1 (OL)	
					Fine to coarse sand with trace fine gravel - very dark grayish brown - wet (SP)	
		RB			Boulder	
					17.5	
	6	SS			Poorly graded gravel with sand, little silt - 45% fine to coarse subrounded to subangular gravel, 43% fine to coarse rounded to subrounded sand, 12% silt/clay, trace clay with 3" seams of gravel with 10-12% fines - dark reddish brown 5YR3/3 - medium dense - wet (GP-GM)	12
20.0						
					21.5	
					Hard drilling gravel's and cobbles. Collapsing hole.	
25.0						
		RB				
30.0						

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2}: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-101**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,808.7 Feet (Continued)	
					Hard drilling gravel's and cobbles. Collapsing hole.	
35.0					35.0	
	7	SS			Poorly graded fine to coarse sand, little silt and fine gravel - 15% fine subrounded gravel, 73% fine to coarse rounded to subrounded sand, 12% silt/clay - dark yellowish brown 10YR3/4 - medium dense - wet (SP-SM)	
		RB				
40.0					40.0	
	8	SS			Poorly graded sand - well rounded to subrounded fine to coarse sand, 8% subrounded fine to medium gravel, 4% fines with 3" seam of fine sand (SP) from 40.2'-40.5' - dark yellowish brown 10YR3/4 - medium dense (SP)	
		RB				
45.0						
	9	SS			46.0	
					46.1 Silty sand seam	
		RB			Poorly graded sand - well rounded to subrounded fine to coarse sand, 8% subrounded fine to medium gravel, 4% fines - dark yellowish brown 10YR3/4 - medium dense (SP)	
50.0					50.0	
	10	SS			Poorly graded fine to coarse sand with fine to medium gravel, trace silt - fine to coarse well rounded to subrounded sand, 30% fine to medium subrounded gravel, 7% fines - dark yellowish brown 10YR3/4 - medium dense - wet (SP-SM)	
					52.0	
		RB			Poorly graded fine to coarse sand with fine gravel, trace silt - well rounded to subrounded fine to coarse sand, 80% very fine to fine sand, 10% fine subrounded gravel and coarse to medium sand, 95 silt - dark yellowish brown 10YR3/4 - medium dense - wet (SP-SM)	
55.0						
60.0						

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 2 OF 5

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-101**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,808.7 Feet (Continued)	
	11	SS			Poorly graded fine to coarse sand with fine gravel, trace silt - well rounded to subrounded fine to coarse sand, 80% very fine to fine sand, 10% fine subrounded gravel and coarse to medium sand, 95 silt - dark yellowish brown 10YR3/4 - medium dense - wet (SP-SM)	
65.0		RB			Easy drilling from 60'-70'	
70.0					70.0	
	12	SS			Silty fine sand- 83% well rounded fine sand, 17% silt/clay - dark reddish brown 5YR3/3 - medium dense - wet (SM)	
75.0		RB				
80.0					80.0	
	13	SS			Poorly graded very fine sand, trace silt (5%) - dark reddish brown 5YR3/3 - dense - wet (SP)	
85.0		RB				
90.0					90.0	

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 3 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-101**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
					SURFACE ELEVATION +8,808.7 Feet (Continued)	
					Poorly graded very fine sand with silt - well rounded very fine sand, 10% silt - reddish brown 5YR4/3 - dense - wet (SM)	
	14	SS				
					93.0	
					93.5 Possible gravel or coarse sand seam	
95.0					Silty fine sand - 80% well rounded fine sand, 20% silt/clay - reddish brown 5YR4/3 - very dense - wet (SM)	
		RB				
100.0						
	15	SS			103.0	
					Poorly graded very fine sand with silt - well rounded sand, 21% silt - reddish brown 5YR4/3 - wet (SM)	
105.0	R1 S16	SON				
					109.5	
110.0	R1 S17	SON			Poorly graded sand with gravel - 80% fine to very fine rounded sand, 5% coarse to medium rounded sand, 15% fine to coarse subrounded to subangular gravel, trace silt - reddish brown 5YR5/3 - wet (SP)	
	R2	SON				
115.0						
120.0					120.0	
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

45

100+

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 4 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: P13-101

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,808.7 Feet (Continued)		
	R3	SON			Well graded gravel with silt and sand - dark reddish brown - wet (GM)		
	18	SS					50/2"
125.0		RB					
					126.0		
					126.5 Gravel's		
	19	WS			Weathered Rock		
					128.6		
	20	WS			Altered sandstone, Hermosa formation - quartz grains - greenish gray - medium to fine grained - massive bedding - hard		
130.0	21	WS					
	22	WS					
	23	WS					
	24	WS					
	25	WS					
135.0	26	WS					
	27	WS					
	28	WS			137.3' to 138 feet fractured zone		
	29	WS					
	30	WS					
140.0	31	WS					
	32	WS					
		RB			141.8' to 142 feet fractured zone 50% fluid loss lost 100 gallons drilling fluid drilling to 143'		
143.0					143.0		
					End of boring at 143.0'. Boring advanced with 2 15/16" Roller Bit and Sonic Drilling methods. Bedrock section of borehole tremi grouted with neat cement grout (30 gallons). High solids bentonite grout was tremi into place in overburden section of borehole. Note: 26' to 143' WS = rotary wash cutting sample obtained.		* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING	BORING STARTED 10/6/12	AECOM OFFICE Denver	
EASTING	BORING COMPLETED 10/12/12	ENTERED BY AMH	SHEET NO. 5 OF 5
WL W.L. @ 7.3' 24 hrs AB	RIG/FOREMAN AMS Compact Sonic 10-C/Cory Watson	APP'D BY	AECOM JOB NO. 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: P13-102 (MW)

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

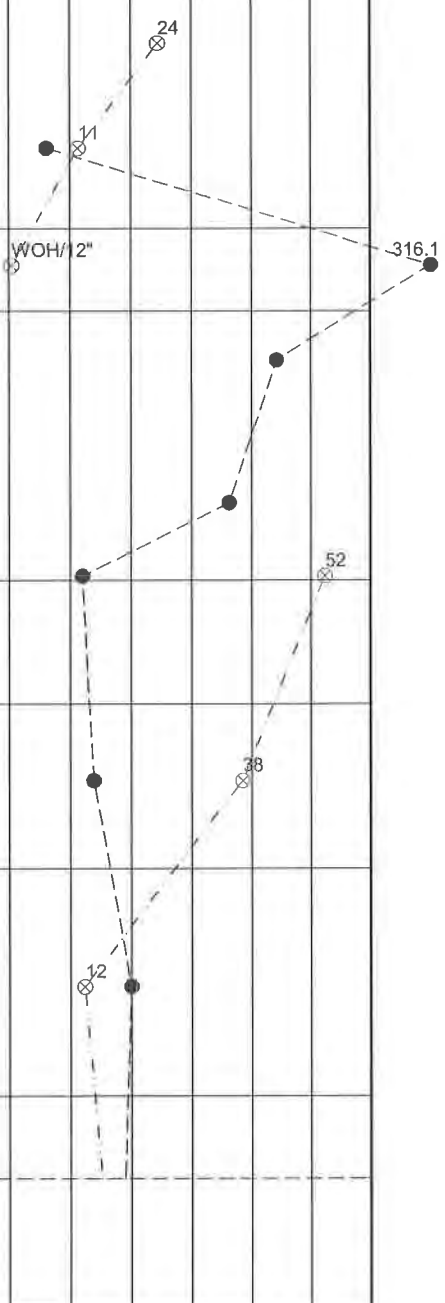
SITE LOCATION: Rico-Argentine

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,810.6 Feet	
		HSA			FILL: Sandy gravel, trace silt - 70% gravel (well rounded to subrounded), 25% sand, 5% fines -10YR4/4 - medium dense - moist (FILL: GW)	
	0	SS				
5.0		HSA				
	1	SS				
		HSA			7.0	
	2	SS			FILL: Silt and clay (settled pond solids, non-plastic) - 100% fines - 5YR4/4 - very loose - moist to wet (FILL: ML)	
		HSA			9.0	
10.0					FILL: Calcines - 90% sand, 10% fines - reddish purple - wet (FILL: SP-SM)	71
	3	ST				
	4	ST				109
15.0						
	5	SS			15.5	
		HSA			Sandy gravel, trace silt - 70% gravel (subrounded to angular), 25% sand, 5% fines - 5YR3/2 (color impacted by calcines) - very dense -wet (GW)	
					18.5	
20.0					Sandy gravel with cobbles, trace silt - 70% gravel (subrounded to angular), 25% sand, 5% fines - 7.5YR3/2 - dense -wet (GW) NOTE: Root mass in cuttings @ 19.0' Cobbles encountered while drilling from 15 ft to 22 ft.	
	6	SS			22.5	
		HSA			Poorly graded sand, some fine gravel, trace silt - 10% gravel (subrounded to angular), 85% sand, 5% fines - 7.5YR4/4 - medium dense- wet (SP) NOTE: 3.5 ft heave into augers at 25'. SPT-N values in sample S-7 are likely artificially low.	
25.0						
	7	SS				
		RB			28.0	
30.0					Well graded sand, some gravel, trace silt - 25% gravel (subrounded to angular), 70% sand, 5% fines - 5YR3/3 - medium dense - wet (SW)	
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



The stratification lines represent the approximate boundary lines between soil types: In situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: P13-102 (MW)

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE / RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
				SURFACE ELEVATION +8,810.6 Feet (Continued)		
	8	SS		Well graded sand, some gravel, trace silt - 25% gravel (subrounded to angular), 70% sand, 5% fines - 5YR3/3 - medium dense - wet (SW)		15
		RB				
				33.0		
	9	SS		Well graded sand, some gravel, little silt - 25% gravel (subrounded to angular), 65% sand, 5% fines - 5YR4/4 - medium dense - wet (SW-SM)		14
35.0		RB		35.0		
	10	SS		Well graded sand, some gravel, trace silt - 25% gravel (subrounded to angular), 70% sand, 5% fines - 5YR3/3 - medium dense - wet (SW)		9
		RB		37.0		
	11	SS		Well graded gravel and sand, trace silt - 50% gravel (subrounded to angular) 42% sand, 8% fines -5YR4/4 - medium dense - wet (GW-GM)		14
40.0		RB		39.5		
	12	SS		Well graded sand, some silt, trace fines - 25% gravel (subrounded to angular), 67% sand, 8% fines - 5YR4/4 - loose - wet (SW-SM)		7
		RB		42.0		
	13	SS		Well graded gravel, some sand, trace silt - 65% gravel (rounded to angular), 30% sand, 5% fines - 5YR4/3 - medium dense - wet (GW)		13
45.0		RB		44.5		
	14	SS		Poorly graded sand, trace gravel, trace silt - 5% gravel (well rounded to subangular), 90% sand, 5% fines- 5YR4/3 - medium dense - wet (SP)		11
		RB		47.0		
	15	SS		Well graded gravel and fine to coarse sand, little silt - 65% gravel (rounded to subangular), 30% sand, 5% fines - 5YR4/4 - medium dense - wet (GW-GM)		14
50.0		RB		49.5		
	16	SS		Well graded sand with gravel - 30% gravel (well rounded to subangular), 65% sand, 5% fines - 5YR4/4 - loose - wet (SW)		8
		RB		53.0		
55.0				Poorly graded sand, little silt, trace gravel - 5% gravel (well rounded to subrounded), 85% sand, 10% fines - 5YR4/4 - medium dense - wet (SP-SM)		
	17	SS				19
		RB				
60.0						
				... continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 2 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: P13-102 (MW)

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,810.6 Feet (Continued)	
	18	SS			Poorly graded sand, little silt, trace gravel - 5% gravel (well rounded to subrounded), 85% sand, 10% fines - 5YR4/4 - medium dense - wet (SP-SM)	
		RB				
63.5					Poorly graded sand, trace gravel, trace silt - 10% gravel (rounded to subrounded), 85% sand, 5% fines - 5YR4/4 - medium dense - wet (SP)	
65.0	19	SS				
		RB				
69.0					Poorly graded sand, little silt, trace gravel - 5% gravel (rounded to subangular), 85% sand, 10% fines - 5YR4/4 - medium dense - wet (SP-SM)	
70.0	20	SS				
		RB				
73.0					Poorly graded predominantly medium to coarse sand, little fine gravel, trace silt - 95% sand, 5% fines - 7.5YR4/4 - medium dense - wet (SP)	
75.0	21	SS				
		RB				
80.0	22	SS				
		RB				
85.0	23	SS				
		RB				
90.0					... continued	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 3 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-102 (MW)**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,810.6 Feet (Continued)	
	24	SS			Poorly graded predominantly medium to coarse sand, little fine gravel, trace silt - 95% sand, 5% fines - 7.5YR4/4 - medium dense - wet (SP)	
		RB			92.5 Silty fine sand, trace fine gravel - 5% gravel (rounded to subrounded), 75% sand, 20% fines - 7.5YR4/3 - medium dense - wet (SM)	
95.0	25	SS				
		RB				
100.0	26	SS			100.0 Poorly graded gravel with sand, trace silt - 60% gravel (well rounded to subangular), 35% sand, 5% fines - 5YR4/4 - dense - wet (SP) NOTE: Cobbles noted at 100'.	
		RB			103.0 Well graded sand with silt, trace gravel - 5% gravel (well rounded to angular), 85% sand, 10% fines - 5YR4/3 - dense - wet (SW-SM)	
105.0	27	SS				
		RB			108.0 Well graded sand with clay and gravel lenses, trace clayey fines - 15% gravel (subrounded to angular), 75% sand, 10% fines - 2.5Y4/1 - medium dense - wet (SW-SC)	
110.0	28	SS				
		RB				
115.0	29	SS				
		RB			119.0	
120.0					Probable Rubble Zone - 100% gravel (subrounded to subangular)	

. . . continued

The stratification lines represent the approximate boundary lines between soil types: In situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 4 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-102 (MW)** — **DRAFT**

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,810.6 Feet (Continued)		
	30	SS			Probable Rubble Zone - 100% gravel (subrounded to subangular)		
122.0		RB					
125.0		C			Attempted to core. No recovery in rock core. Borehole abandoned. Artesian gain in recirculation tub while coring.		
127.0					End of boring @ 127.0'. Boring advanced with HSA to 25', boring advanced with rock bit and mud rotary to 122 ft. Boring advanced with core barrel to 127.0'. Piezometer installed in borehole.		

Borings performed by Cascade Drilling and logged by Anderson Engineering Company, Inc. AECOM is not responsible for the soil classifications.

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1387785.454	BORING STARTED: 10/19/12	AECOM OFFICE: Denver	
EASTING: 2268076.647	BORING COMPLETED: 10/23/12	ENTERED BY: AMH	SHEET NO.: 5 OF 5
WL: W.L. @ 6.5' W.D.	RIG/FOREMAN: CME-85/Rory Pilmore	APP'D BY:	AECOM JOB NO.: 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-103 (MW)**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

SURFACE ELEVATION +8,811.5 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL
		HW		FILL: Silty well graded gravel - pale brown 10YR6/3 - medium dense - moist (FILL: GM)
	1	SS		
		RB		
			4.5	
5.0	2	SS	5.0	FILL: Possible pond sediments - brown, transition to reddish brown (FILL)
				FILL: Calcine - dusty red 10Y3/3 - very soft - wet (FILL)
	3	ST		
	4	ST		
10.0			10.0	
		RB		Possible FILL: Well graded fine to coarse gravel, some fine to coarse sand, trace silt - dusty red 10R3/3 - very dense - wet (Possible FILL: GW-GM)
	5	SS		
		RB		
			13.6	
	6	SS		Cobbles and boulders
15.0				
		RB	16.5	
				Well graded gravel, some sand, trace silt with reddish brown fragments of sand-size sandstone - olive gray 5Y5/2 - medium dense - wet (GW-GM)
20.0	7	SS		
		RB		
			23.0	
				Well graded sand, some gravel, trace silt, trace clay - dark brown 10YR3/3 - medium dense - wet (SW-SM)
25.0	8	SS		
			26.0	
		RB		Silty fine to coarse sand, little gravel - dark grayish brown 2.5Y4/2 - medium dense - wet (SM)
	9	SS		
30.0				
				, , , continued

UNIT DRY WT. LBS./FT.^{3}

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

14

1/12"

178.5

53

50/3"

23

25

12

The stratification lines represent the approximate boundary lines between soil types: In situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 2

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **P13-103 (MW)**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

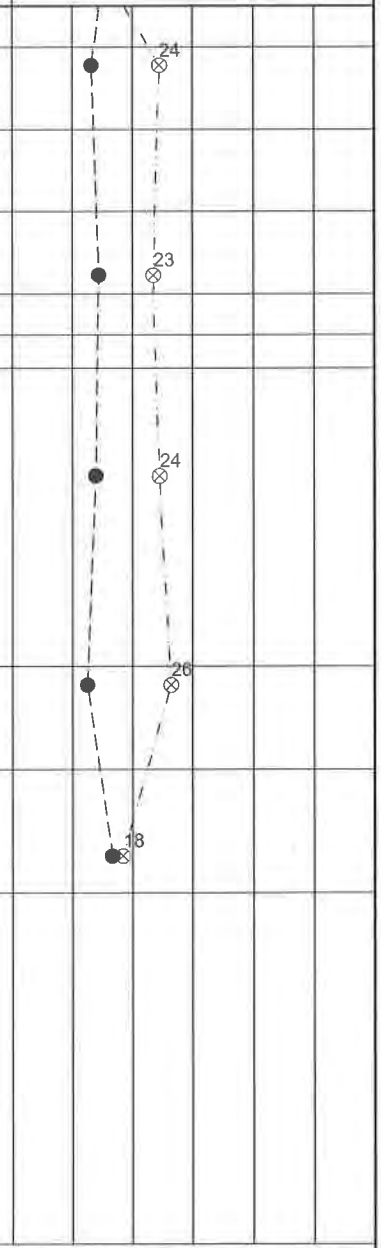
SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,811.5 Feet (Continued)	
		RB			31.0	
	10	SS			Well graded sand, some gravel, trace silt, trace clay - olive brown 2.5Y4/4 - medium dense - wet (SW-SM)	
					33.0 Cobbles and boulders	
35.0		RB			35.0	
					Well graded sand and gravel, trace silt, trace clay - olive brown 2.5Y4/4 - medium dense - wet (SW-SM)	
	11	SS			37.0	
					38.0 Silt inclusion (coarse gravel size) - reddish brown 2.5YR4/4 - wet (ML)	
					38.8 Cobble	
40.0		RB			Poorly graded fine to coarse sand, some fine to coarse gravel,t race silt - dark yellowish brown 10YR3/4 - medium dense - wet (SP-SM)	
	12	SS				
45.0		RB				
					46.0	
	13	SS			Poorly graded fine to coarse gravel and fine to coarse sand, little silt - dark yellowish brown 10YR3/4 - medium dense - wet (GM)	
					48.5	
50.0		RB			Poorly graded fine to coarse sand, some gravel, trace silt - dark brown 10YR3/3 - medium dense - wet (SP-SM)	
	14	SS				
51.5					51.5	
					End of boring at 51.5 ft. HW casing installed to 18.5'. Boring advanced to 50 feet with2 15/16" roller bit. Boring advanced to 51.5 ft with split spoon sampler. Piezometer installed to 18.1 feet.	



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1387856.435	BORING STARTED: 10/1/12	AECOM OFFICE: Denver	
EASTING: 2267994.083	BORING COMPLETED: 10/13/12	ENTERED BY: AMH	SHEET NO.: 2 OF 2
WL: W.L. @ 7.8' 10-8-12	RIG/FOREMAN: Modified Ditchwitch/Greg Schroth	APP'D BY:	AECOM JOB NO.: 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR1**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³
					SURFACE ELEVATION +8,863.5 Feet	
	1	SS			Gravelly lean CLAY (CL) - angular gravel, cobbles - medium dense - damp - brown (talus)	
		PA				
5.0						
	2	SS			Siltier - dark brown	
		PA				
10.0					Flat talus chips	
	3	SS			Cobbles - boulders	
		PA			10.5 Clayey GRAVEL (GC) - angular gravel to cobbles - medium dense - damp - brown	
15.0					14.0 Subrounded gravel to cobbles	
	4	SS			Very Gravelly SILT with Sand (ML) - subrounded gravel, 2" minus - dense - damp - brown	
		PA			16.0 Gravelly CLAY with Sand (CL) - subangular gravel, 3" minus - damp - brown (CL)	
20.0					Cobble/boulder	
	5	SS			20.0 Yellow staining	
					Silty GRAVEL with Sand (GM) - subrounded gravel to cobble/boulder - medium dense - damp - brown	
		PA			22.0 ALLUVIUM - Gravelly lean CLAY with Sand (CL) - subrounded gravel to cobble - dense - damp - red-brown	
25.0					Yellow staining, black staining, angular gravel	
	6	SS				
		PA			Fat clay, less yellow staining, no black staining, less gravel (CH)	
30.0					30.0	
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

18 22 41 10 44

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 1 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM	CLIENT **Atlantic Richfield Company**	LOG OF BORING NUMBER **SSR1**
	PROJECT NAME **Rico-Argentine Site - OU01**	ARCHITECT-ENGINEER **Drilling Company: Boart Longyear**

SITE LOCATION

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² — 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % — 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT) — 10 20 30 40 50

SURFACE ELEVATION +8,863.5 Feet (Continued)

DEPTH(FT)	SAMPLE NO	SAMPLE TYPE	DESCRIPTION OF MATERIAL	STANDARD PENETRATION BLOWS/(FT)
	7	SS	Gravelly CLAY with Sand (CL) - subangular gravel, 4" minus - wet - loose to dense - red-brown - yellow staining around 30.0', plastic (talus)	25
		PA	Same with cobbles Less plastic with boulder	
35.0	8	SS		
		PA	Yellow staining Boulder	
40.0	9	SS		35
42.0		PA	Clayey GRAVEL with coarse Sand (GC) - subangular gravel, few 4" minus cobbles - wet - red-brown - yellow staining	
43.5			ALLUVIUM - Well graded GRAVEL with Sand (GW) - subrounded gravel, 3" minus - grades less sand with cobbles - wet - red-brown	
45.0	10	SS	Well graded SAND with Gravel (SW) - subrounded gravel, 1" minus grades with cobbles - wet - medium dense - red-brown - upward fining sequence in shoe	25
46.0		PA	Gravelly fat CLAY, few coarse Sand, some angular Gravel (CL) - subrounded gravel and cobbles - wet - red-brown - cobbles are (hermosa SS)	
50.0	11	SS	Clayey GRAVEL with Sand (GC) - subrounded, 4" minus gravel with cobbles - extremely dense - wet - red-brown (talus)	>76/12"
52.0		PA	Well graded GRAVEL with Sand (GW) - subrounded gravel, 2" minus grades to cobbles with less sand - wet - brown More sand More cobbles	
57.0	12	SS	ALLUVIUM - Well graded SAND (SW) - extremely dense - wet - red-brown	91 (water content 63.0)
58.0				
58.5			Well graded GRAVEL (GW) - angular, 1" minus - wet - red-brown	
60.0				

... continued

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757 | SHEET NO. 2 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR1**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS /FT^3
					SURFACE ELEVATION +8,863.5 Feet (Continued)	
		PA			Clayey GRAVEL with Sand (GC) - subrounded gravel, 4" minus with cobbles - wet - red-brown With yellow staining	
					62.0	
	13	SS			Silty GRAVEL with Sand (GM) - subrounded gravel/cobbles - extremely dense - wet - red-brown	
65.0		PA			Cobble/boulder in bit - recovered 1.0' below cobble and 1.0' above from drill deck	
					67.0	
	14	SS			Poorly graded SAND (SP), very fine to fine - dense - wet - red-brown	
					Grades to medium sand	
70.0					70.5 Grades to coarse sand	
		PA			Well graded GRAVEL with Clay and Sand (GW-GC) - wet - red-brown - subrounded gravel 2" minus	
					71.5 Poorly graded SAND (SP) - wet - red brown - very fine to fine	
					73.0' - Grades to medium sand 73.5' - Grades to coarse sand	
					74.0	
75.0	15	SS			Well graded GRAVEL with Sand, coarse Sand, trace Silt (GW) - subangular to subrounded gravel, 2" minus - medium dense - wet - red-brown	
		PA			76.0 Well graded SAND with Gravel, trace Silt (SW-SM) - subrounded gravel, 3" minus - wet - red-brown	
					77.0 Very fine Silty SAND (SM) - wet - red-brown	
	16	SS			Well graded SAND (SW) - grades fine to coarse - some rounded gravel, 1"minus - wet - red-brown - saturated - clean	
					79.0	
80.0		PA			80.0 Poorly graded coarse SAND (SP) - wet - red-brown	
					Well graded Sandy GRAVEL, trace Silt (GW) - rounded, 2" minus - wet - red-brown (GW)	
					81.0 Well graded SAND, minimal fine Sand (SW) - grades coarser with rounded gravel, 1" minus - wet - red-brown - clean	
	17	SS				
85.0		PA			Color change in matrix to dark gray brown	
					87.0	
	18	SS			Poorly graded SAND (SP) - grades fine to coarse - wet - red-brown	
					88.0	
					88.5 Well graded GRAVEL with Sand (GW) - 2" minus gravel - wet - red-brown (talus)	
90.0					..... continued	

>50/6"

36

15

>50/3"

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO: 60157757

SHEET NO: 3 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR1**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

UNCONFINED COMPRESSIVE STRENGTH TONS/FT^2 (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT^3
					SURFACE ELEVATION +8,863.5 Feet (Continued)	
		PA			Well graded SAND, minimal fine Sand (SW) - rounded grains - saturated - dark gray-brown Fine sand, red-brown - saturated Dark gray-brown with cobbles	
	19	SS			94.0	
95.0					Well graded GRAVEL with Sand (GW) - subrounded gravel-cobble - wet - gray-brown	
					95.5 Poorly graded SAND with Silt, very fine Sand (SP-SM) - wet - gray-brown (SP-SM)	
					97.5 Poorly graded SAND, fine Sand (SP) - wet - gray-brown	
100.0					100.0	
					End of Boring. Boring logged by: S. Johnston Casing: 7.0" I.D.	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388874	BORING STARTED: 10/9/11	AECOM OFFICE: Denver	
EASTING: 2268226	BORING COMPLETED: 10/10/11	ENTERED BY: SJH	SHEET NO: 4 OF 4
WL: 44.0' WD	RIG/FOREMAN: SONIC C600/	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR2**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.³
					SURFACE ELEVATION +8,850.3 Feet	
	1	SS			Clayey SILT with angular Gravel (ML) - extremely dense - dry - brown (talus)	
		PA				
5.0						
	2	SS			6.0	
		PA			Lean CLAY with angular Gravel and cobbles 5" minus (CL) - loose to dense - dry - brown	
10.0						
	3	SS				
		PA				
15.0					Cobble/boulder	
	4	SS				
		PA				
20.0						
	5	SS				
		PA			SS cobble/boulder	
					23.0 POSSIBLE ALLUVIAL FAN DEPOSIT? - CLAY with Gravel (CL) - extremely dense - damp - red-brown with dark brown staining	
25.0						
	6	SS				
		PA			12" boulder	
					Angular gravel/cobble 4" minus	
30.0					30.0	
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

>50/6"

16

4

34

>53/12"

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO: **60157757**

SHEET NO: **1** OF **4**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: SSR2

PROJECT NAME: Rico-Argentine Site - OU01

ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE / RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
				SURFACE ELEVATION +8,850.3 Feet (Continued)		
	7	SS		Gravelly CLAY (CL) - talus - very moist - brown - medium-high plasticity (possibly CH)		42
		PA		Cobble/boulder		
35.0				35.0		
	8	SS		Clayey GRAVEL with Sand (GC) - extremely dense - wet - brown		>50/6"
				36.5		
		PA		Silty GRAVEL with Sand (GM) - extremely dense - wet - brown		
				Cobble/boulder 6" plus		
40.0				Saturated		
	9	SS				>50/6"
				43.0		
				ALLUVIUM - Well graded SAND with Gravel (SW) - subrounded gravel-cobble 4" minus - wet - red-brown		
		PA		44.0		
45.0				Well graded Sandy GRAVEL (GW) - subrounded gravel-cobble 5" minus - wet - red-brown		
				47.0		
	10	SS		Gravelly CLAY with Sand (CL) - subangular to subrounded gravel 3" minus - extremely dense - wet - red-brown - trace silt		>50/6"
				48.0		
50.0		PA		Well graded GRAVEL with Sand, trace Silt (GW) - subangular to subrounded gravel 3" minus - very dense - wet - red-brown		
	11	SS				
55.0		PA		Saturated		
	12	SS				50
60.0				60.0		
				continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60157757

SHEET NO. 2 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR2**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT.³
					SURFACE ELEVATION +8,850.3 Feet (Continued)	
		PA			Silty GRAVEL, with little Sand, trace Clay (GM) - subrounded gravel 3" minus - wet - red-brown - saturated	
					62.0	
	13	SS			Poorly graded SAND, trace Clay (SP) - very fine to fine - wet - red-brown (SP)	
					64.0	
65.0		PA			Well graded SAND with Gravel, trace Silt (SW) - subrounded gravel 2" minus - wet - red-brown	
					65.0	
					Silty GRAVEL with Sand (GM) - subrounded gravel 2" minus - grades to clayey gravel - wet - red-brown	
					67.0	
	14	SS			Well graded GRAVEL with Silt and Sand (GW-GM) - rounded gravel-cobble 4" minus - very dense - wet - red-brown - saturated	
70.0		PA				
					72.0	
	15	SS			Poorly graded, fine SAND (SP) - very dense - wet - red-brown - saturated	
					73.5	
					74.0 Well graded SAND with Gravel, trace Silt (SW) - wet - red-brown	
75.0		PA			Silty GRAVEL with Sand (GM) - rounded gravel-cobble 4" minus - wet - red-brown	
					77.0	
	16	SS			77.5 Well graded SAND with Gravel, trace Silt (SW) - subrounded gravel 1" minus - wet - red-brown	
					Silty GRAVEL with Sand (GM) - subrounded subangular gravel 2" minus - very dense - wet - red brown	
80.0		PA			80.5	
					Well graded SAND, trace Gravel (SW) - wet - red-brown	
					81.5	
					82.0 Well graded GRAVEL, trace fines or Sand (GW) - subrounded to subangular gravel 2" minus - wet - red-brown	
	17	SS			Well graded GRAVEL with Sand (GW) - subrounded to rounded gravel 2" minus - extremely dense - wet - red-brown - saturated	
85.0		PA			85.0	
					Well graded GRAVEL with Silt and Sand (GW-SM) - rounded gravel-cobbles 4" minus - wet - red-brown - saturated	
					87.0	
	18	SS			Well graded SAND, few Gravel, trace Silt (SW) - round 1" minus gravel - wet - red-brown	
90.0					90.0	
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

79

51

62

>95/12"

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 3 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR2**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT³
					SURFACE ELEVATION +8,850.3 Feet (Continued)	
		PA			Well graded SAND with Gravel (SW) - rounded 2" minus gravel - wet - red-brown	
	19	SS				
					94.0	
95.0					Poorly graded fine SAND with Silt (SP-SM) - few .5" minus gravel - wet - red-brown	
					96.0	
		PA			Poorly graded SAND (SP) - few .5" minus gravel - wet - red-brown	
100.0					100.0	
					End of Boring Drilled from 87.0' to 100.0' with no SPT Boring logged by: S. Johnston Casing: 7.0" I.D.	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388666	BORING STARTED: 10/7/11	AECOM OFFICE: Denver	
EASTING: 2268236	BORING COMPLETED: 10/9/11	ENTERED BY: SJH	SHEET NO: 4 OF 4
WL: 35.5' WD	RIG/FOREMAN: SONIC C600/	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR3**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,849.3 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE / RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³
	1	SS		0.5 CONCRETE pad	
				Well graded GRAVEL with Clay and Sand (GW-GC) - subangular to subrounded 3" minus gravel - wet - brown	
		PA		2.5 Well graded GRAVEL with Sand (GW) - angular to rounded gravel-cobbles 6" minus - medium dense - dry - brown	
5.0	2	SS			
		PA		7.0 Damp Gravelly CLAY with Sand (GC) - subangular gravel - cobble 4" minus - damp - brown	
10.0	3	SS		10.0 Well graded GRAVEL with Sand (GW) - subangular to rounded - wet - brown - loose - saturated	
		PA		11.0 Gravelly CLAY with Sand (CL) - gravel to cobbles - subangular to subrounded 5" minus - very dense to loose - damp - brown	
15.0	4	SS			
		PA			
20.0	5	SS		Less cobbles	
		PA		23.0 Clayey GRAVEL with Sand (GC) - gravel to cobbles - subangular to subrounded 5" minus - very dense to medium dense - damp - brown	
25.0	6	SS			
		PA			
30.0				continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

Plotted values: 4, 22, 7, 65, 56

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO. 1 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR3**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,849.3 Feet (Continued)		
	7	SS			Clayey GRAVEL with Sand (GC) - gravel to cobbles - subangular to subrounded 5" minus - very dense to medium dense - damp - brown		26
					32.0		
		PA			Well graded GRAVEL with Sand (GW) - subangular to subrounded gravel 3" minus - wet - brown		
35.0							
	8	SS			Many cobbles		
		PA			37.0		
	9	SS			Well graded GRAVEL with Clay and Sand (GW-GC) - subangular gravel/cobbles/boulders - extremely dense to very dense - wet - brown		>106/12"
40.0		PA			*NOTE: 4" clast of fine grain well graded SAND (SW) damp, dark red (maroon), cohesive. Possibly spent ore.		
	10	SS			Same from SPT without SW clast		50
45.0		PA			Saturated		
	11	SS			Color change to red-brown with cobble/boulder		>50/4"
		PA					
50.0							
	12	SS			Many cobbles		
		PA			52.0		
	13	SS			Well graded GRAVEL with Sand (GW) - subangular to subrounded gravel to cobbles - wet - red-brown		
					53.0		
					Poorly graded SAND (SP) - medium grain - wet - red-brown - saturated		
					54.5		
55.0		PA			Well graded GRAVEL with Sand, trace Silt (GW) - subrounded gravel - cobble 6" minus - wet - red-brown		
					Casing advanced with auger to 58.0'		
					58.0		
	14	SS			Poorly graded very fine SAND (SP) - wet - red-brown - saturated		56
60.0					Grades to medium		
					continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO. 60157757

SHEET NO. 2 OF 4

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR3**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

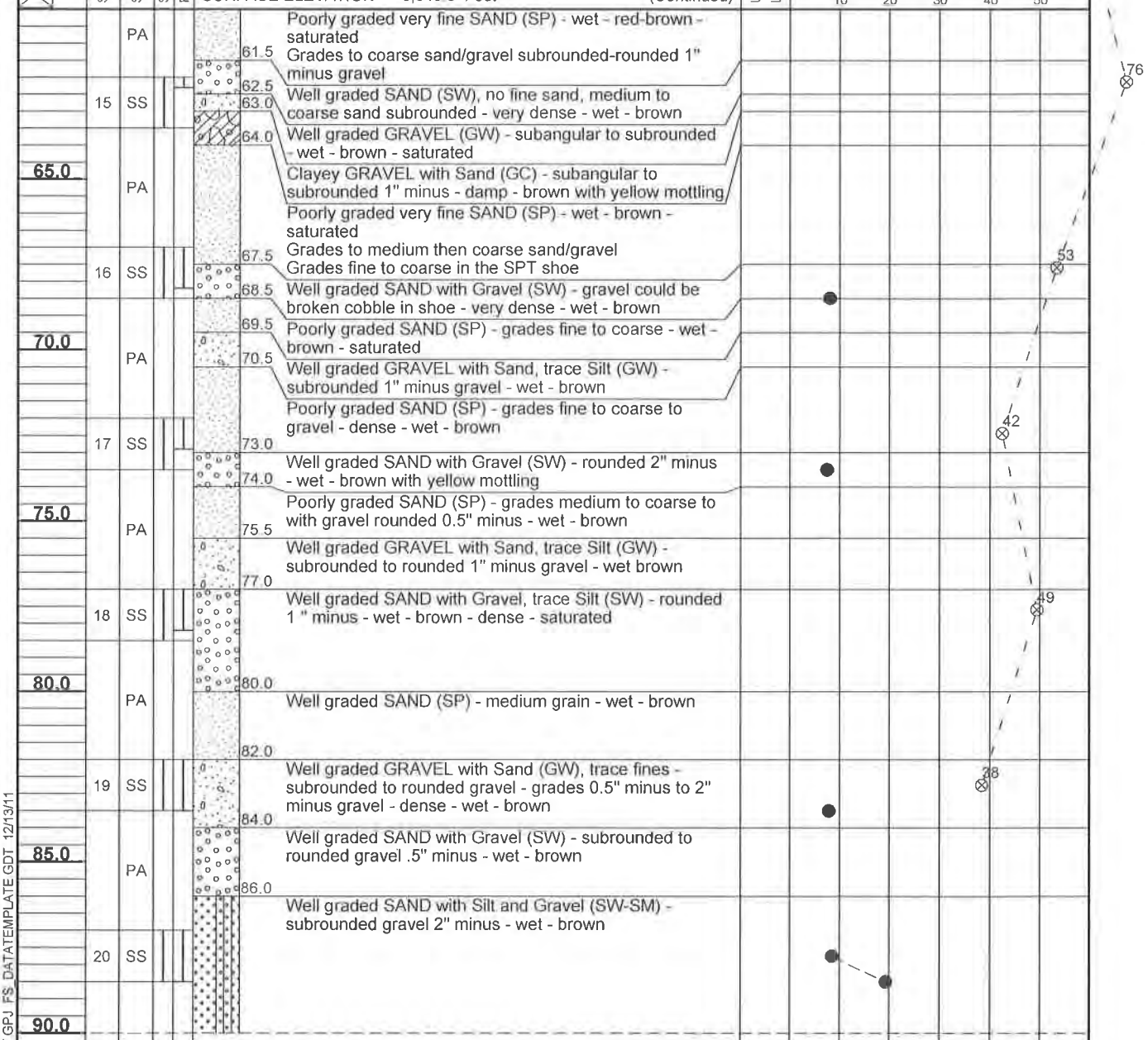
SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT³
					SURFACE ELEVATION +8,849.3 Feet (Continued)	
		PA			Poorly graded very fine SAND (SP) - wet - red-brown - saturated	
					61.5 Grades to coarse sand/gravel subrounded-rounded 1" minus gravel	
	15	SS			62.5 Well graded SAND (SW), no fine sand, medium to coarse sand subrounded - very dense - wet - brown	
					63.0	
					64.0 Well graded GRAVEL (GW) - subangular to subrounded - wet - brown - saturated	
65.0		PA			Clayey GRAVEL with Sand (GC) - subangular to subrounded 1" minus - damp - brown with yellow mottling	
					Poorly graded very fine SAND (SP) - wet - brown - saturated	
					67.5 Grades to medium then coarse sand/gravel	
	16	SS			Grades fine to coarse in the SPT shoe	
					68.5 Well graded SAND with Gravel (SW) - gravel could be broken cobble in shoe - very dense - wet - brown	
					69.5 Poorly graded SAND (SP) - grades fine to coarse - wet - brown - saturated	
70.0		PA			70.5 Well graded GRAVEL with Sand, trace Silt (GW) - subrounded 1" minus gravel - wet - brown	
					Poorly graded SAND (SP) - grades fine to coarse to gravel - dense - wet - brown	
	17	SS			73.0	
					74.0 Well graded SAND with Gravel (SW) - rounded 2" minus - wet - brown with yellow mottling	
75.0		PA			Poorly graded SAND (SP) - grades medium to coarse to with gravel rounded 0.5" minus - wet - brown	
					75.5 Well graded GRAVEL with Sand, trace Silt (GW) - subrounded to rounded 1" minus gravel - wet brown	
					77.0	
	18	SS			Well graded SAND with Gravel, trace Silt (SW) - rounded 1 " minus - wet - brown - dense - saturated	
80.0		PA			80.0 Well graded SAND (SP) - medium grain - wet - brown	
					82.0	
	19	SS			Well graded GRAVEL with Sand (GW), trace fines - subrounded to rounded gravel - grades 0.5" minus to 2" minus gravel - dense - wet - brown	
					84.0	
85.0		PA			Well graded SAND with Gravel (SW) - subrounded to rounded gravel .5" minus - wet - brown	
					86.0	
					Well graded SAND with Silt and Gravel (SW-SM) - subrounded gravel 2" minus - wet - brown	
	20	SS				
90.0						
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO: **60157757**

SHEET NO: **3** OF **4**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR3**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,849 3 Feet (Continued)		
		PA			90.5 Poorly graded fine SAND (SP) - wet - tan-brown		
	21	SS			94.0		
95.0		PA			Poorly graded very fine SAND with Silt (SP-SM) - wet - brown *NOTE: Includes 3" layers of poorly graded very fine sand with clay (SP-SC) 97.0		
	22	SS			Poorly graded very fine SAND, trace Silt (SP) - wet - brown		
100.0		PA			Gravel-cobbles 4" minus - subangular to subrounded 100.0		
					End of Boring Boring logged by: S. Johnston Casing: 7.0" I.D.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388867	BORING STARTED: 10/10/11	AECOM OFFICE: Denver	
EASTING: 2268034	BORING COMPLETED: 10/13/11	ENTERED BY: SJH	SHEET NO: 4 OF: 4
WL: 32.0' WD	RIG/FOREMAN: SONIC C600/	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM	CLIENT: Atlantic Richfield Company	LOG OF BORING NUMBER: SSR4
	PROJECT NAME: Rico-Argentine Site - OU01	ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
				SURFACE ELEVATION +8,839 5 Feet		
		GB		PDF EMBANKMENT FILL (GW) - Not logged		
				4.0		
5.0				FILL - Calcines (SM-SP) - sand and silt sized - medium dense to loose		24
	1	GB				
		GB				9
10.0						
	2	GB				
		GB				11
15.0						
	3	GB				14
		GB				
20.0						4
	4	GB				
		GB				
25.0				25.0		51/6"
	5	GB		ALLUVIUM - Silty Sandy Cobbly GRAVEL (GW) - subrounded to subangular - cobbles to 3.0" - less than approximately 5-10% silt - very dark gray 7 5YR 3/1 - extremely dense to dense		
		GB		25 0-30.0' - Significant sample loss - log/depth approximate - no sample taken Sample 5: Recorded as "51/Driller recalls "refusal""		18/6"
30.0				30.0		
				continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757 | SHEET NO 1 OF 3

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: SSR4

PROJECT NAME: Rico-Argentine Site - OU01

ARCHITECT-ENGINEER: Drilling Company: Boart Longyear

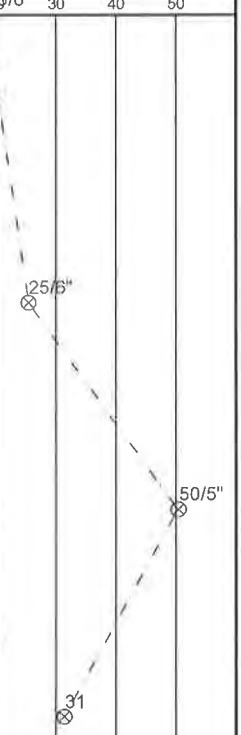
SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS./FT³
					SURFACE ELEVATION +8,839.5 Feet (Continued)	
	6	GB			ALLUVIUM - Silty Sandy Cobbly GRAVEL (GW) - subrounded to subangular - cobbles to 3.0" - less than approximately 5-10% silt - very dark gray 7.5YR 3/1 - dense and extremely dense above 50.0' Becoming dark brown 7.5YR 3/4 with cobbles to 4.0" at 30.0' Sample 6: Recorded as "18/Driller recalls "refusal"""	
35.0		GB				
	7	GB			Becomes strong brown 7 5YR 4/6 Sample 7: Recorded as "25/Driller recalls "refusal""	
40.0		GB			Becomes yellowish brown 10YR 4/6 - wet (Approximate depth)	
	8	GB				
45.0		GB				
	9	GB			Significant reduction in max gravel size to 1.0" - well graded - predom. subrounded with subangular - yellowish red 5YR 4/6 - wet	
50.0		GB				
	10	GB			ALLUVIUM - Gravelly SAND (SW) - subangular to well rounded gravels - weak red 2.5YR 4/2 - wet Driller reports 5.0' heave, cleanout then 5.0' heave (attempting clean out using flapper bit, driller report 3.0' heave) Skipping to 57.0' Sample 10: Driller lost sample on surface - reports "all same stuff"	
55.0		GB				
	11	GB			Loose condition may be due to blow-in from ground water	
60.0		GB			60.0	
					continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1, 2, 3, 4, 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10, 20, 30, 40, 50)

STANDARD PENETRATION BLOWS/(FT) (10, 20, 30, 40, 50)



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO 60157757

SHEET NO 2 OF 3

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM	CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **SSR4**
	PROJECT NAME: **Rico-Argentine Site - OU01**	ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS/FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,839.5 Feet (Continued)		
					End of Boring Boring logged by: R. Anderson (0.0-42.0')/Interpreted by A. Jewell, A. Jewell (42.0-60.0') Casing: 5.5" I.D.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1388644**	BORING STARTED: **10/13/11**	AECOM OFFICE: **Denver**	
EASTING: **2268005**	BORING COMPLETED: **10/13/11**	ENTERED BY: **SJH**	SHEET NO: **3** OF: **3**
WL: **38.0' WD Estimated**	RIG/FOREMAN: **PROSONIC 800T/**	APP'D BY: **EED**	AECOM JOB NO: **60157757**

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR5**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

SURFACE ELEVATION +8,832.3 Feet

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³
		GB			PDF EMBANKMENT FILL - Silty Sandy GRAVEL (GW) - approximately 60% gravel to 2.0" or larger, 30% sand and 10% silt fines - predom. subrounded, also subangular to well rounded - brown 7.5YR 4/4 - moist	
4.0						
5.0	1	GB			FILL - Wasterock - Clayey Sandy GRAVEL (GC) - chunks of highly altered rock forming residual clayey sands - approximately 40 % gravel, 35% sand and 25% clay - well rounded to subangular gravels to 2.0" or larger - various colors, dark reddish brown 2.5YR 3/4, very dark grayish brown 10YR 3/2 and yellowish brown 10YR 5/8 - moist	
8.0		GB				
10.0	2	GB			FILL - Process waste? and manmade debris (cables) - Clayey Gravelly SAND (SM) - approximately 50 % sand, 30% low plastic clay and 20% gravel - subangular to subrounded gravel to 2.0" or larger - reddish black 10YR 2.5/1 - medium dense - moist	
	3	ST			FILL - Calcines - fine sand and silt sized (SM) - reddish purple to purplish black (no munsell) - moist - loose to very loose 11.5-13.5' - Attempted shelby tube - no recovery	
15.0		GB			Becoming wet Higher silt content from 15.0-17.5'	
	4	GB				
20.0		GB			Lower silt content, wet and coarser sand sized from 18.0-20.0'	
	5	GB				
25.0		GB				
25.5	6	GB			COLLUVIUM/POSSIBLE WASTEROCK - Clayey Sandy Cobbly GRAVEL (GC) - approximately 40% gravel, 35 % sand and 25% clay - cobbles to 5.0" or larger - predom. subangular to angular - fragments predom. greenstone - clay moderately plastic - very dark gray 7.5YR 3/1 - extremely dense - moist	
30.0		GB			29.5' - Becomes wet - clay fines approx. 15% (GW-GC)	
30.0	7	GB			POSSIBLE ALLUVIUM - Clayey Sandy Cobbly GRAVEL (GC) - approximately 40% gravel, 35 % sand and 25% clay - cobbles to 5.0" or larger - predom. subangular to angular - fragments predom. greenstone - clay moderately plastic - very dark gray 7.5YR 3/1 - extremely dense - moist Becomes dark brown 7.5YR 3/2 at 30.0'	
35.0		GB				

. . . continued

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT)

10 20 30 40 50

17

5

3

3

76.7

50/5"

87/11"

50/4"

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual

AECOM JOB NO 60157757

SHEET NO 1 OF 2

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR5**

PROJECT NAME: **Rico-Argentine Site - OU01**

ARCHITECT-ENGINEER: **Drilling Company: Boart Longyear**

SITE LOCATION

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT LBS /FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50/4")
					SURFACE ELEVATION +8,832.3 Feet (Continued)		
	8	GB			34.0' - Becomes dark yellowish brown 10YR 3/4 - silt fines approx. 15% (GM)		
36.5					ALLUVIUM - Silty fine SAND with Gravel (SM) - gap graded - dark yellowish brown 10YR 4/6 - moist		
37.5		GB			ALLUVIUM - Silty Sandy GRAVEL (GM) - approximately 50% gravel to 2.0" or larger, 35% sand and 15% silt fines - well graded - subrounded to angular - dark yellowish brown 10YR 4/6 - loose - wet		9
40.0	9	GB			Silty SAND (SP) - silt <5% - well graded - scattered gravel to 1.5" - gravel content approx. <5% - predom fine to medium grained sand with subrounded coarse grains - dark yellowish brown 10YR 3/6 - loose to medium dense Dark brown from 40.5-42.0'		
45.0		GB					12
	10	GB			Gravel content decreases substantially		
47.0		GB			Fine SAND (SP) - silt <5% - weak red 2.5YR 4/2 - loose - wet		9
50.0	11	GB			Driller reports 4.0' heave - pushing casing and cleaning out with flapper bit - may account for lower N values		
		GB			Includes 10-15% silt fines from 52 0-54.0' (SM)		7
55.0	12	GB			Silt content increasing slightly (SP)		
60.0		GB					5
61.5	13	GB			61.5		
					End of Boring Boring logged by: A. Jewell Casing: 5.5" I.D.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388408	BORING STARTED: 10/12/11	AECOM OFFICE: Denver	
EASTING: 2268067	BORING COMPLETED: 10/13/11	ENTERED BY: SJH	SHEET NO: 2 OF 2
WL: 15.5' WD	RIG/FOREMAN: MINI-SONIC C100/D. Cervantes	APP'D BY: EED	AECOM JOB NO: 60157757

AECOM LOG 60157757.GPJ FS_DATATEMPLATE.GDT 12/13/11

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: SSR-101 (MW)

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	STANDARD PENETRATION BLOWS/(FT)
				SURFACE ELEVATION +8,845.4 Feet		
	1	SS		FILL: Well graded gravel, some fine to coarse sand, little silt/clay - dark brown 7.5YR3/2 - medium dense to dense - moist (FILL: GC) NOTE: Cobbles noted at 1.5 ft		23
		RB				
	2	SS				64
5.0		RB		5.0		
	3	SS		FILL: Well graded sand, some fine to coarse gravel, some silt and clay - brown 10YR4/3 - medium dense - moist (FILL: SC)		11
		RB		7.0		
	4	SS		FILL: Well graded gravel, some fine to coarse sand, little silt and clay - very pale brown 10YR8/3 - loose - moist (FILL: GM)		10
10.0		RB		10.0		
	5	SS		FILL (MINE WASTE ROCK): Well graded gravel and fine to coarse sand, some silt/clay, with pyrite flecks - oxidized colors, grays to red browns grading to mostly yellow 2.5Y7/6 with oxidized zones - dense to loose- moist (FILL: GM - MINE WASTE ROCK)		31
		RB				
	6	SS				45
15.0		RB				
	7	SS				17
		RB				
	8	SS				10
20.0		RB				
	9	SS				10
		RB		23.0		
25.0				FILL: Well graded gravel and sand, trace silt/clay - yellowish brown 10YR5/4 - loose - moist (FILL: GW-GM)		
	10	SS				5/6"
		RB				
	11	SS		28.0		5/6"
	11B	SS		28.5		5/6"
	11C	SS		FILL: Poorly graded gravel and sand, little silt/clay, trace organics - 40% fine gravel, 38% fine to coarse sand, 14% to 22% silt/clay - dark		
30.0						

. . . continued

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 6

AECOM LOG: 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: SSR-101 (MW)

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,845.4 Feet (Continued)	
		RB			brown 10YR3/3 - loose - wet (FILL: GM)	
					Organic sandy silt (possible old topsoil), some fine to coarse sand, trace wood fragments, trace roots and fibrous plant material - black 10YR2/1 - stiff - moist (ML-OL) (LOI = 23.1%)	
	12	SS			31.5	
		RB			Well graded sand and fine to coarse gravel, little silt and clay - very dark grayish brown 2.5Y3/2 with zones of brown, variable color - extremely dense - moist (SM)	
35.0	13	SS				
	13A	SS			35.2' to 35.5' Slightly organic clayey sand - very dark grayish brown 2.5Y3/2 - very dense - wet (SC)	
					36.0	
		RB			Gravel/Cobble/Boulder	
40.0	14	SS			40.7	
		RB			Boulder	
					43.0	
45.0					Poorly graded sand, some fine to coarse gravel, little silt and clay, with gravel seams - dark grayish brown 10YR3/4 - dense - wet (SM)	
	15	SS				
		RB				
50.0					50.0	
	16	SS			Poorly graded gravel and fine to coarse sand, trace silt, with seams of less gravel and more sand- reddish brown 5Y4/4 - medium dense - wet (GP-GM)	
		RB				
55.0					55.0	
		RB			Boulder	
					56.0	
	17	SS			Poorly graded sand, little fine gravel, trace silt - dark brown 7.5Y3/2 - medium dense - wet (SP-SM)	
		RB				
60.0					60.0	
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2}: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50

55/6"

5

50/2"

32

24

14

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 2 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-101 (MW)**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

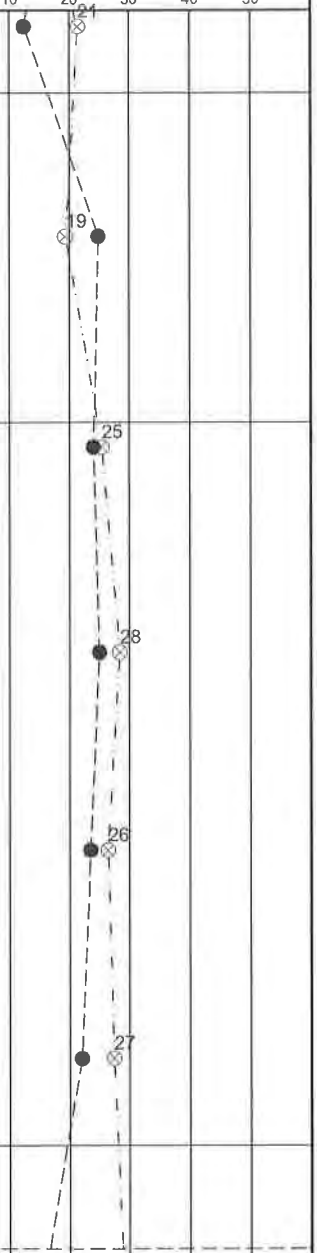
DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,845.4 Feet (Continued)	
	18	SS			Well graded sand, some fine to coarse gravel, trace silt - dark brown 7.5Y3/2 - medium dense - wet (SW-SM)	
					62.0	
		RB			Poorly graded very fine sand, little silt - dark reddish gray 5YR4/2 - medium dense - wet (SM)	
65.0						
	19	SS				
		RB				
70.0					70.0	
	20	SS			Fine sand, trace silt - reddish brown 5YR grading to brown 7.5Y4/2 - medium dense - wet (SP)	
		RB				
75.0						
	21	SS				
		RB				
80.0						
	22	SS				
		RB				
85.0						
	23	SS				
		RB			87.5 Poorly graded fine to medium sand, trace silt, some fine to coarse subrounded gravel - brown 7.5Y4/2 - medium dense - wet (SP)	
90.0						

. . . continued

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2}: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 3 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-101 (MW)**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

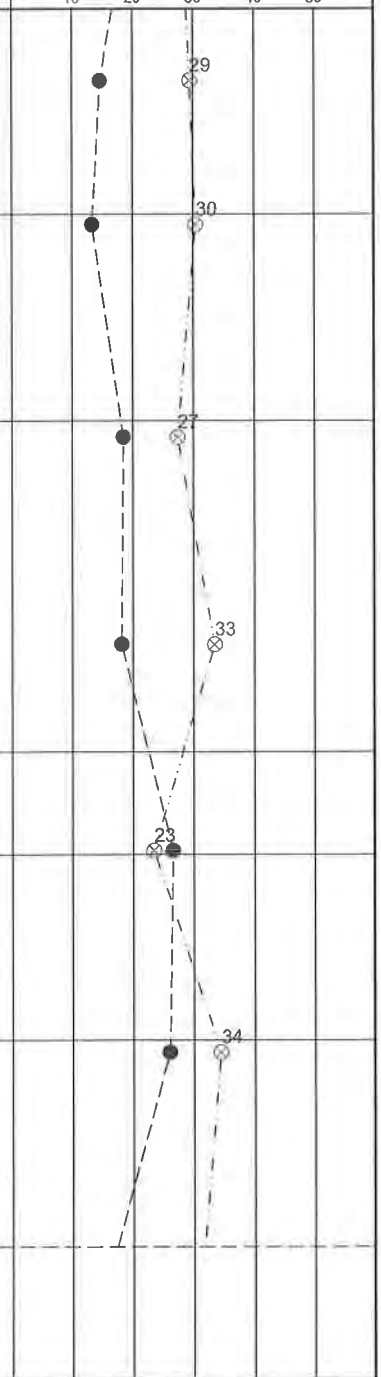
SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,845.4 Feet (Continued)	
					Poorly graded fine to medium sand, trace silt, some fine to coarse subrounded gravel - brown 7.5Y4/2 - medium dense - wet (SP)	
	24	SS				
		RB				
95.0					95.0	
					Poorly graded fine to medium sand, little gravel, little silt and clay - dark brown 10YR3/3 - dense - wet (SM)	
	25	SS				
		RB				
100.0					100.0	
					Fine to coarse sand, trace fine gravel, trace silt - brown 7.5YR4/4 - medium dense to dense - wet (SP)	
	26	SS				
		RB				
105.0						
	27	SS				
		RB			108.0	
					Poorly graded very fine sand, some silt - reddish brown 5YR4/3 - loose - wet (SM)	
110.0					110.5	
	28	SS			Fat clay, high plasticity, laminated (CH)	
		RB				
115.0					115.0	
	29	SS			Poorly graded fine to very fine sand, little silt - brown 10YR5/4 changing to dark grayish brown 2.5Y4/2 - dense - wet (SP-SM)	
		RB				
120.0						
					. . . continued	



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 4 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-101 (MW)**

LOG OF BORING NUMBER: **DRAFT**

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

SURFACE ELEVATION +8,845.4 Feet (Continued)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL
	30	SS		Poorly graded fine to very fine sand, little silt - brown 10YR5/4 changing to dark grayish brown 2.5Y4/2 - dense - wet (SP-SM)
		RB		
125.0				125.0
	31	SS		Silt and very fine sand - dark reddish brown 3/3 - dense - wet (ML)
		RB		
130.0				130.5
	32	SS		Silt, fast dilatancy, non-plastic-non-cohesive, bedded to massive bedding, trace fine sand - dark reddish gray 5YR5/2 - dense - wet (ML)
135.0		RB		
				137.0
	33	SS		137.9 Poorly graded fine to very fine sand, trace silt - brown 7.5Y4/2 - dense - wet (SP)
	33A	SS		138.5 Poorly graded fine to medium sand, trace fine gravel - very dark grayish brown 2.5Y - dense - wet (SP)
		RB		138.8 Gravel inferred from drilling resistance
140.0	34	SS		Boulders & weathered slumped sections of Hermosa Sandstone - Colluvium
	RUN 1	DB		
145.0				
	RUN 2	DB		
150.0				

UNIT DRY WT. LBS./FT.^{3}

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %

10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT)

10 20 30 40 50

81 36 40 16/6" 23/6"

. . . continued

The stratification lines represent the approximate boundary lines between soil types: In situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 5 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-101 (MW)**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,845.4 Feet (Continued)	
155.0		RB			Boulders & weathered slumped sections of Hermosa Sandstone - Colluvium	
	35	SS				
160.0		RB				
	36	SS			160.5 Well graded gravel and fine to coarse sand, trace silt - dark brown 7.5YR3/4 - very dense - wet (GW)	
	37	WS			163.4 Possible weathered bedrock - Hermosa formation sandstone	
165.0	38	WS			166' Hard unfractured rock	
	RUN 3	RB				
169.2		DB			169.2 End of boring at 169.2 ft. HW casing installed to 162'. Boring advanced to 168.2 feet with roller bit. Boring advanced to 168.2 ft with tricone rock bit. Three attempt to obtain NX rock core, all core runs no recovery. Tremi grouted borehole with high solids bentonite grout to 50 feet. Placed medium bentonite chips from 40' to 50'. Piezometer installed to 37.9 ft. Note: Sample 37 & 38 WS = rotary wash cutting samples obtained.	

78

56

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING	1388742.446	BORING STARTED	10/15/12	AECOM OFFICE	Denver
EASTING	2268096.74	BORING COMPLETED	10/24/12	ENTERED BY: AMH	SHEET NO. 6 OF 6
WL	W.L. @ 27.8' @ 24 hr A.B.	RIG/FOREMAN	Sonic/Kyle King	APP'D BY	AECOM JOB NO. 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13 GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: SSR-102/102A
DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
				SURFACE ELEVATION +8,839.0 Feet	
	1	AS		FILL: Clayey well graded sand, some fine gravel - 26% gravel, 47% sand, 27% fines - brown 10YR5/3 - medium dense - moist (FILL: SC)	
	2	SS			
5.0		HSA		5.0	
	3	SS		FILL: Clayey gravelly silt, some fine to coarse sand - dark brown 7.5YR3/4 - loose - moist (FILL: ML)	
		HSA			
	4	SS			
10.0		HSA		10.0	
	5	SS		FILL: Clayey gravel, some fine to coarse sand - 89% sand and gravel, 11% fines - dark brown 10YR3/3 - loose to medium dense - wet (FILL: GC)	
		HSA			
	6	SS			
15.0		HSA		15.4	
	7	SS		Partly organic gravelly clay (possible buried topsoil), low plasticity - black - medium dense - moist (GC)	
				16.5	
		HSA		Cobbles and gravel	
				17.5	
	8	SS		Silt, little coarse sand, little gravel, non-plastic - dark brown 10YR3/4 - stiff (CL)	
20.0		HSA		20.0	
	9	SS		Lean clay, some fine to coarse gravel, little fine to coarse sand - dark brown 10YR3/4 - stiff (CL)	
		HSA		22.8	
	10	ST		Well graded gravel, some fine to coarse sand, little silt and clay - dark grayish brown 10YR4/2 - extremely dense - wet (GC-GM)	109
25.0	11	SS			
				26.0	
		HSA		Cobble	
				27.0	
	12	SS		Well graded gravel, some fine to coarse sand, little silt and clay - dark grayish brown 10YR4/2 - medium dense - wet (GC-GM)	
30.0					

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-102/102A**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,839.0 Feet (Continued)	
		RB			Well graded gravel, some fine to coarse sand, little silt and clay - dark grayish brown 10YR4/2 - medium dense - wet (GC-GM)	
32.5						
	13	SS			33.0 Possible FILL: Well graded gravel with silt and fine to coarse sand size rock fragments - dark red 2.5Y3/6 - extremely dense - wet (GC-GM)	
	13A	SS				
35.0		RB			35.0 Silty fine to coarse sand and gravel - 35% gravel, 35% sand, 30% fines - dark yellowish brown 10YR3/4 - extremely dense - wet (SM-GM)	
	14	HS SS			Boulders/cobbles - fine to coarse sand and gravel fragments in wash cuttings NOTE: Boring SSR-102 ended at 35'. See Notes below.	
		RB				
39.0						
40.0	15	SS			Well graded sand, some fine to coarse gravel, little silt and clay - dark yellowish brown 10YR4/4 - dense - wet (SM)	
		RB				
45.0						
	16	SS				
		RB				
50.0					50.0	
	17	SS			Well graded sand, some fine to coarse gravel, little silt and clay (19.1%) - dark yellowish brown 10YR4/4 - dense - wet (SM)	
55.0		RB				
57.0						
	18	SS			Poorly graded sand, little silt - 15.9% fines - dark yellowish brown 10YR4/4 - medium dense - wet (SM)	
60.0		RB				
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2}: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50

19/6" 71/9" 50/1" 25/2" 18/6" 39 27

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 2 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company

LOG OF BORING NUMBER: SSR-102/102A

DRAFT

PROJECT NAME: Rico - Argentine Mine Site

ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

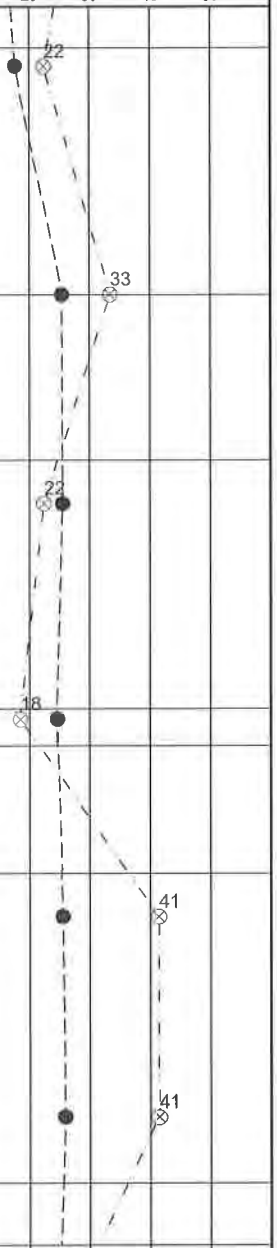
SITE LOCATION: Rico-Argentine

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,839.0 Feet (Continued)	
					61.0	
	19	SS			Poorly graded fine to coarse sand, little silt and clay (17.5%-25.4%) - dark yellowish brown 10YR4/4 - medium dense - wet (SM)	
65.0		RB				
					67.0	
	20	SS			Silt with very fine sand in thin bedding seams - brown 7.5Y4/4 - dense - wet (ML-SM)	
70.0		RB				
					71.0	
	21	SS			Poorly graded fine sand, trace silt - brown 10YR4/3 - medium dense - wet (SP)	
75.0		RB				
					77.0	
	22	SS			Silt (non-plastic) - brown 7.5Y4/2 - medium dense - wet (ML)	
					77.9	
80.0		RB			Poorly graded fine sand, trace silt with bedded seams of silt and very fine sand - brown 7.5YR4/2 - wet (SP)	
					81.0	
	23	SS			Thickly bedded to laminated silt (non-plastic), silty clay, clay silt, and fine to very fine sand - 79% fines - slight changes in color from brown clays to red brown silt and sand, brown 7.5YR4/2 - dense - wet (ML)	
85.0		RB				
	24	SS				
					88.5	
					Gravel	
90.0		RB			90.0	
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2}: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50



* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 3 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-102/102A**

LOG OF BORING NUMBER: **DRAFT**

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,839.0 Feet (Continued)	
					Silt, with seams of very fine sandy silt - 94.6% fines - brown 7.5YR4/2 - medium dense - wet (ML)	
	25	SS				
95.0		RB				
					96.0 Silt and fine sand - 51.4% fines - brown 7.5YR4/2 - dense - wet (ML)	
	26	SS				
100.0		RB				
					101.5 Silt (non-plastic) with very fine sand and occasional silty very fine sand seams - 52.5% - 83.2% fines - brown 7.5YR4/2 - medium dense to dense - wet (ML)	
	27	SS				
105.0		RB				
	28	SS				
110.0		RB				
	29	SS				
115.0		RB				
	30	SS				
					118.5 Well graded sand, some fine to coarse gravel, trace silt - brown 7.5YR4/2 - dense - wet (SW-SM)	
120.0		RB				

25 44 38 30 15 45

. . . continued

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 4 OF 6

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-102/102A**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

SURFACE ELEVATION +8,839.0 Feet (Continued)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					Well graded sand, some fine to coarse gravel, trace silt - brown 7.5YR4/2 - dense - wet (SW-SM)	
	31	SS			122.0	
	31A	SS			Well graded sand and gravel, little silt - 42% gravel, 46% sand, 12% fines - brown 7.5YR4/4 - dense to very dense - wet (SM)	
125.0		RB			126.0	
	32	SS			Fine to coarse sand, silty very fine sand, and silty gravel in 3" layers - very dense - wet (SM)	
130.0					130.0	
					Boulder	
		RB			131.0 Well graded gravel with fine to coarse sand, some clay - gray 10YR5//1 - extremely dense - wet (GC)	
135.0						
	33	SS			136.3	
		RB			Hermosa altered sandstone - very strong - greenish gray with pyrite flecks - fine grained - massive bedding - fresh - competent - moderately fractured, joints and possibly shear clay infilling zone from 141.9'-142.4' RQD = 48.7% poor no drilling fluid loss during core run.	
140.0						
	RUN 1	DB			141.9	
		RB			142.6 Clay with gravel and sand (CH) possible shear clay and or joint infilling	
	34	WS			Sandstone - Solid rock noted during drilling	
145.0					Fractured zone noted during drilling Solid rock noted during drilling	
		RB			Fractured zone noted during drilling Solid rock noted during drilling	
150.0					150.0	
					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2}: 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT %: 10 20 30 40 50

STANDARD PENETRATION BLOWS/(FT): 10 20 30 40 50

17/6" 50 77 50/3"

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 5 OF 6

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**	LOG OF BORING NUMBER: **SSR-102/102A**
PROJECT NAME: **Rico - Argentine Mine Site**	ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,839.0 Feet (Continued)	
					Boring SSR-102 ended at 35 feet due to 4 1/4" ID HSA becoming crooked. Borehole abandoned with bentonite chips. Offset boring SSR-102A performed 5.5 feet south of boring SSR-102. Boring SSR-102A blind drilled to 35 feet. Advanced SSR-102A to a depth of 150.0 feet using a combination of mud rotary with 3 7/8" tricone roller bit & following with HSA in stages as needed to prevent caving. The HSA were set to 115 feet after sampling. Conventional NX size coring was completed from 140.0 to 142.4 feet with 100% recovery of core. NX coring could not be continued in borehole as it was uncased from 115 to 142.4 feet. From 142.4 to 150.0 feet mud rotary with 3 7/8" tricone roller bit was drilled to confirm bedrock.	* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **1388431.331**	BORING STARTED: **11/2/12**	AECOM OFFICE: **Denver**	
EASTING: **2268226.372**	BORING COMPLETED: **11/11/12**	ENTERED BY: **AMH**	SHEET NO.: **6** OF **6**
WL: **W.L. @ 22.8' W.D.**	RIG/FOREMAN: **CME-85/Reggie Castro**	APP'D BY:	AECOM JOB NO.: **60239818**

Reggie Castro

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-103**

LOG OF BORING NUMBER: **DRAFT**

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,909.7 Feet	
	1	BS			Silty gravel with sand - dark yellowish brown 10YR3/4 - very stiff (GM)	
5.0						
	1	BS				
10.0						
	1	BS				
15.0						
	1	BS				
					17.5 Boulder 18.5	
					Sandy clay, little to some gravel, occasional cobbles and boulders, rock clasts predominantly fine-grained altered sandstone - brown 10YR4/3 (CL)	
20.0						
	1	BS				
25.0						
	1	BS				
30.0						
					. . . continued	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 1 OF 4

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-103**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

SURFACE ELEVATION +8,909.7 Feet (Continued)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³
35.0	1	BS			Sandy clay, little to some gravel, occasional cobbles and boulders, rock clasts predominantly fine-grained altered sandstone - brown 10YR4/3 (CL)	
35.0	1	BS			Sandstone boulder	
37.0	2	BS			Gravel size rock fragments, arkosa, shale, sandstone in sandy silty clay matrix, 25% gravel (GC)	
40.0	2	BS				
45.0	2	BS			Gravel size rock fragments, arkosa, shale, sandstone in sandy silty clay matrix, 15% gravel (GC)	
50.0	2	BS			Gravel size rock fragments, arkosa, shale, sandstone in sandy silty clay matrix, 30% gravel (GC)	
55.0	2	BS			Sandy silty with 15% rock clasts, deeply weathered rock (ML)	
60.0					. . . continued	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 2 OF 4

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-103**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

SURFACE ELEVATION +8,909.7 Feet (Continued)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
65.0	2	BS			Sandy silt with 20% sand to gravel sized rock clasts (1/4" -2") of sandstone, arkosa, or shale (ML)		
70.0	2	BS					
	3	BS			70.0 Sandy silt with gravel, 30% rock clasts 1/4"-3" in diameter, predominantly angular to subangular fine gravel, sandstone - moist, with 5% deeply weathered black shale clasts. (ML)		
75.0	3	BS					
80.0	3	BS			80.0 Sandy silt with gravel, stiff, moist, with 10-15% rock fragments		
85.0	3	BS			86.4		
		SON			Hard consistent drilling in possible hard boulder or bedrock		
90.0					90.0		
					. . . continued		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 3 OF 4

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM	CLIENT: Atlantic Richfield Company	LOG OF BORING NUMBER: SSR-103 DRAFT
	PROJECT NAME: Rico - Argentine Mine Site	ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.

SITE LOCATION: Rico-Argentine

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,909.7 Feet (Continued)		
	1	C			Siltstone, dark greenish gray (3/1), closely fractured, hard, moderately strong, slightly weathered. Intensely fractured from 92.0'-95.0'		
	2	C					
95.0					95.0		
					End of boring @ 95.0'. Boring advanced with sonic drilling methods and roller bit rotary wash techniques to 90.0'. Borehole advanced to 95.0' with double barrel NX core.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388844.294	BORING STARTED: 10/25/12	AECOM OFFICE: Denver	
EASTING: 2268406.699	BORING COMPLETED: 10/29/12	ENTERED BY: AMH	SHEET NO.: 4 OF 4
WL: W.L. @ 9' W.D.	RIG/FOREMAN: AMS Compact Sonic 10-C/Kyle King	APP'D BY:	AECOM JOB NO.: 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-104**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,887.8 Feet	
	1	SON			Well graded gravel and fine to coarse sand, some silt - brown 7.5YR4/4 - dry (GM)	
5.0						
	2	SON				
					8.0	
	3	SON			Well graded gravel, some fine to coarse sand, some clay, with cobbles and possible small boulders - dark brown 10YR3/3 - moist (GC)	
10.0						
	4	SON				
15.0						
					17.5	
	1	SON			Well graded gravel with clay, 60% gravel (angular to subrounded), 25% sand, 15% fines, HCL = strong - 2.5Y4/2 (dark grayish brown) (GW-GC)	
20.0					20.0	
	2	SON			Clayey gravel, 35% gravel (angular to subrounded), 30% sand, 25% fines, HCL=strong - 10YR4/3 (brown) (GC)	
					22.5	
	3	SON			Well graded gravel with clay, 65% gravel (angular to subrounded), 25% sand, 10% fines, HCL = strong - 10YR4/4 (Dark Yellowish Brown (GW-GC)	
25.0					25.0	
	4	SON			Clayey gravel, 35% gravel (angular to subrounded), 30% sand, 25% fines, HCL=strong - 10YR4/3 (brown) (GC)	
		SON				
30.0					30.0	
					. . . continued	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. **60239818**

SHEET NO. **1** OF **5**

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company
LOG OF BORING NUMBER: SSR-104
DRAFT
PROJECT NAME: Rico - Argentine Mine Site
ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.
SITE LOCATION: Rico-Argentine

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)
STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,887.8 Feet (Continued)	
	5	SON			Well graded gravel with clay, 60% gravel (subangular to well rounded), 25% sand, 15% fines, HCL=strong - 2.5Y3/3 (dark olilve brown) (GW-GC) (possible mix with alluvium)	
	6	SON				
35.0					35.0	
	7	SON			Well graded gravel with silt, 60% gravel (subangular to well rounded), 30% sand, 10% fines, HCL=strong - 2.5Y4/2 (dark grayish brown) (GW-GM)	
40.0					40.0	
	8	SON			Clayey gravel, 50% gravel (angular to subrounded), 30% sand, 20% fines, HCL=weak - 10YR4/4 (dark yellowish brown) (GC) scattered oxidized rock	
45.0					44.5	
	9	SON			Clayey gravel, 55% gravel (angular to rounded), 30% sand, 25% fines, HCL=strong - 10YR4/2 (dark grayish brown) (GC)	
	10,11	SON			48.5	
50.0					Poorly graded gravel with silt, 70% gravel (subangular to rounded), 20% sand, 10% fines, HCL = strong - 10YR4/3 (brown) (GP-GM) 50.0	
	12	SON			Clayey gravel, 55% gravel (angular to rounded), 30% sand, 25% fines, HCL=strong - 10YR4/2 (dark grayish brown) (GC) 52.5	
	13	SON			Poorly graded gravel with silt, 70% gravel (subangular to rounded), 20% sand, 10% fines, HCL = strong - 10YR4/3 (brown) (GP-GM)	
55.0					55.0	
	14,15	SON			Clayey gravel, 55% gravel (angular to rounded), 30% sand, 25% fines, HCL=strong - 10YR4/2 (dark grayish brown) (GC) 56.5	
	15	SON			Poorly graded gravel with clay, 70% ravel (angular to subrounded), 20% sand, 10% fines, HCL=strong - 10YR4/3 (brown) (GP-GC)	
60.0					60.0	
					... continued	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818 | SHEET NO. 2 OF 5

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-104**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,887.8 Feet (Continued)	
	16	SON			Well graded gravel with clay, 55% gravel (subangular to rounded), 30% sand, 15% fines, HCL=Weak - 10YR4/3 (brown) (GW-GC) some non-hermosa gravel	
					62.5	
	17	SON			Poorly graded gravel with clay, 70% ravel (angular to subrounded), 20% sand, 10% fines, HCL=strong - 10YR4/3 (brown) (GP-GC)	
65.0					65.0	
	18	SON			Poorly graded gravel with silt, 70% gravel (angular to subrounded), 25% sand, 5% fines, HCL=strong - 10YR4/2 (dark grayish brown) (GP-GM) (mostly hermosa gravel)	
70.0					70.0	
	19,20	SON			Well graded gravel with silt, 45% gravel (subangular to well rounded), 40% sand, 15% fines, HCL=strong - 10YR4/2 (dark grayish brown) (GW-GM)	
					71.5	
					Well graded gravel with clay, 50% gravel (subangular to well rounded), 35% sand, 15% fines, HCL=N/A - 10YR3/2 (very dark grayish brown) (GW-GC) (scattered oxidized zones)	
	20	SON				
75.0					75.0	
					Well graded gravel with clay, 50% gravel (subangular to rounded), 30% sand, 15% fines, HCL=N/A - 2.5Y2.5/1 (black) (GW-GC) (contains organics, red sandstone)	
					76.5	
					Poorly graded gravel with silt, 75% gravel (subangular to rounded), 20% sand, 5% fines, HCL=N/A - 10YR3/3 (dark grayish brown) (GP-GM) (red sandstone gravels)	
					77.5	
	21,22,23	SON			Well graded gravel with clay, 50% gravel (subangular to rounded), 30% sand, 15% fines, HCL=N/A - 2.5Y2.5/1 (black) (GW-GC) (contains organics, red sandstone)	
80.0						
					81.5	
					Well graded gravel with silt, 60% gravel (subangular to rounded), 35% sand, 5% fines, HCL=N/A - 10YR4/3 (brown) (GW-GM)	
	23	SON				
85.0					85.0	
	24	SON			Poorly graded gravel with silt, 15% gravel (subangular to well rounded), 30% sand, 15% fines, HCL=None - 2.5Y2.5/1 (black) (GP-GC) (decreasing organic content with depth)	
	24	SON			89.0	
90.0					Oxidized/weathered cobbles/boulders (89'-90')	
					90.0	
					. . . continued	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818

SHEET NO. 3 OF 5

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

AECOM

CLIENT: Atlantic Richfield Company
LOG OF BORING NUMBER: SSR-104
DRAFT
PROJECT NAME: Rico - Argentine Mine Site
ARCHITECT-ENGINEER: Anderson Engineering Company, Inc.
SITE LOCATION: Rico-Argentine

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)
PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)
STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
					SURFACE ELEVATION +8,887.8 Feet (Continued)	
	25	SON			Poorly graded gravel with silt, 15% gravel (subangular to well rounded), 65% sand, 20% fines, HCL=weak - 2.5Y3/2 (very dark grayish brown) (GP-GM) (trace organics, oxidizes brown, decreasing organics with depth)	
	25,26	SON			93.0 Poorly graded gravel, 70% gravel (subangular to subrounded), 25% sand, 5% fines, HCL=Strong - (GP) (gradation impacted by drilling red sandstone and weathered hermosa gravels)	
95.0	26	SON			96.0	
	27	SON			Poorly graded gravel with clay, 65% gravel (angular to subrounded), 25% sand, 10% fines, HCL=strong - (GP-GC) mostly hermosa gravels scattered tabular black shale fine gravels)	
100.0					102.0	
	28	SON			Clayey gravel, 50% gravel (angular to subrounded), 30% sand, 20% fines, HCL=weak (GC)	
					104.0	
105.0	RUN 2	C			Siltstone, thinly bedded to laminated, slightly weathered, hard - fair quality, 24 deg inclination, HCL=non, pyrite alterations, 2.5/5GY (grey) (RQD = 70%)	
					106.5	
	RUN 3	C			Sandstone, thickly bedded, slightly weathered, hard to very hard, moderately to intensely fractured, 24 deg inclination, HCL=None, grey (2.5/5GY) (RQD = 23%)	
110.0					111.5	
	RUN 4	C			Sandstone, thickly bedded, slightly weathered, hard to very hard, moderately to intensely fractured, 24 deg inclination, HCL=None, grey (2.5/5GY) (RQD = 40%)	
					114.5	
115.0	RUN 5	C			Sandstone, thickly bedded, slightly weathered, hard to very hard, moderately to intensely fractured, 24 deg inclination, HCL=None, grey (2.5/5GY) (RQD = 43%)	
					119.5	
120.0					. . . continued	

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

AECOM JOB NO. 60239818 | SHEET NO. 4 OF 5

AECOM

CLIENT: **Atlantic Richfield Company**

LOG OF BORING NUMBER: **SSR-104**

DRAFT

PROJECT NAME: **Rico - Argentine Mine Site**

ARCHITECT-ENGINEER: **Anderson Engineering Company, Inc.**

SITE LOCATION: **Rico-Argentine**

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +8,887.8 Feet (Continued)		
	RUN 6	C			Sandstone, thickly bedded, slightly weathered, hard to very hard, moderately to intensely fractured, 24 deg inclination, HCL=None, grey (2.5/5GY) (RQD = 44%)		
124.5					124.5		
					End of boring @ 124.5'. Boring advanced to 104 ft using sonic equipment. Boring advanced to 124.5' with NX core barrel.		

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: 1388530.939	BORING STARTED: 10/30/12	AECOM OFFICE: Denver	
EASTING: 2268370.687	BORING COMPLETED: 11/4/12	ENTERED BY: AMH	SHEET NO.: 5 OF 5
WL: None Observed	RIG/FOREMAN: AMS Compact Sonic 10-C/Kyle King	APP'D BY:	AECOM JOB NO.: 60239818

AECOM LOG 60239818 RICO-UPDATED 4-8-13.GPJ FS_DATATEMPLATE.GDT 4/29/13

Test Pit Logs

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME Rico, Co PROJECT NO ST Louis Ponds	BORING NUMBER: TP 5		COORDINATES OR LOCATION:
LOGGED BY CA CHECKED BY:	SURFACE ELEVATION:		GWL DEPTH No water (ENCOUNTERED) GWL DEPTH (STATIC)
DRILLING METHOD: Backhoe Test Pit	HOLE DIAMETER: N/A	FLUID USED N/A	DATE STARTED: 10-13-08 DATE COMPLETED 10-13-08
CASING TYPE AND SIZE N/A SCREEN TYPE AND SIZE		FROM ___ A.G.S TO ___ B.G.S FROM ___ TO ___ B.G.S	

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5	0.8					Gravel on surface, Dark brown soil cap - mainly silt	
1.0	1.1 ①					yellow orange tails & mine waste with gravel and rock (2" - 6" ø) 70% rock	
1.5						Brown soil mixed with red calcine tailings, silty sand containing gravel and rock (2" to 12") ~ 20-30% rock	
2.0							
2.5	②						
3.0							
3.5	3.6						
4.0						Brown soil, silty sand mixed with calcine tailings, minor gravel and some rock (2-6") ~5% rock	
4.5							
5.0							
5.5							
6.0	③						
6.5							
7.0							
7.5							
8.0	7.9						NO WATER ENCOUNTERED

NOTES

TD= 7.9'

1) Test Pit Backfilled + Compacted

X - Sample Collected + Composit of Material

ANDERSON

BORING LOG

PAGE ____ OF ____

PROJECT NAME: Rico CO PROJECT NO: St. Louis Ponds	BORING NUMBER: TP-8	COORDINATES OR LOCATION:
LOGGED BY: CS CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH: 0 Near water level (ENCOUNTERED) GWL DEPTH (STATIC)
DRILLING METHOD: Backhoe Test Pit	HOLE DIAMETER: 1/A	FLUID USED: NA
DATE STARTED: 10-14-08 DATE COMPLETED: 10-14-08		
CASING TYPE AND SIZE SCREEN TYPE AND SIZE: NA	FROM ____ A.G.S TO ____ B.G.S FROM ____ TO ____ B.G.S	

DEPTH (')	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5						Brown sandy Silt with gravel and cobbles, moist ~5% Rock	
1.0							
1.5							
2.0							
2.5						Gray/white sandy gravel, several Boulders (≥12" ϕ at this layer) ~40% Rock	
3.1						Brown sandy Silt with gravel and cobbles, moist ~5% rock	
3.5							
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							
7.0							

TD= 6.0

NOTES

1) Test Pit Backfilled & Compacted

X - Sample Collected, Composite of Material

ANDERSON

BORING LOG

PAGE ____ OF ____

PROJECT NAME: Rico CO PROJECT NO: St. Louis Ponds	BORING NUMBER: TP-13	COORDINATES OR LOCATION:
LOGGED BY: KC CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH: 0 No water (ENCOUNTERED) / GWL DEPTH (STATIC)
DRILLING METHOD: Backhoe Test Pit	HOLE DIAMETER: NA / FLUID USED: NA	DATE STARTED: 10-14-03 DATE COMPLETED: 10-14-03
CASING TYPE AND SIZE: NA SCREEN TYPE AND SIZE:		FROM ____ A.G.S TO ____ B.G.S FROM ____ TO ____ B.G.S

DEPTH (')	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5						Gravel surface	
1.0						Gray sandy silt and gravel, stiff	
1.5						Brown silty sand and gravel	
2.0							
2.5							
3.0						Gray sandy silt and gravel, stiff	
3.5						Red calcine tailings	
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0							

NOTES

TD= 8.0

1) Test Pit Backfilled + compacted

X - Sample collected, Composit of Material

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME: Rico, Co	BORING NUMBER: TP-14	COORDINATES OR LOCATION
PROJECT NO.: ST CLOUD PONDS		
LOGGED BY:	SURFACE ELEVATION	GWL DEPTH: 0 NO WATER (ENCOUNTERED)
CHECKED BY:		GWL DEPTH: (STATIC)
DRILLING METHOD: BACKHOE TEST PIT	HOLE DIAMETER: PIT	FLUID USED: N/A
DATE STARTED: 10-10-08		
DATE COMPLETED: 10-10-08		
CASING TYPE AND SIZE: N/A	FROM ____ A.G.S. TO ____ B.G.S.	
SCREEN TYPE AND SIZE:	FROM ____ TO ____ B.G.S.	

DEPTH (')	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5	0.3					Ground Cover course	
1.0						Red to dark red tailings (calcine) mixed with stained rock & tailings (cream colored) Rock mixed in tailings (2"-14") ~10% rock	
1.5							
2.0							
2.5							
3.0							
3.5							
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							
7.0							
7.5							
8.0	8.0						no water

NOTES

TD= 8.0'

NO WATER

BACKFILLED & COMPACTED

X - SAMPLE Collected Composit of Material

ANDERSON

BORING LOG

PAGE ____ OF ____

PROJECT NAME: Rico CO Lower Ponds	BORING NUMBER: TP-15	COORDINATES OR LOCATION:
PROJECT NO: St Louis Ponds		
LOGGED BY: CA	SURFACE ELEVATION:	GWL DEPTH: 0 (encountered)
CHECKED BY:		GWL DEPTH: (STATIC)
DRILLING METHOD: Back hoe Test Pit	HOLE DIAMETER: NA	FLUID USED: NA
		DATE STARTED: 10-13-08
		DATE COMPLETED: 10-13-08
CASING TYPE AND SIZE:		FROM ____ A.G.S TO ____ B.G.S.
SCREEN TYPE AND SIZE: NA		FROM ____ TO ____ B.G.S

DEPTH	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5						Light Brown soil, silty Clay with some sand, large rock (2"-32") ~35-40% rock	
1.0							
1.5							
2.0							
2.5							
3.0							
3.5							
4.0	①						
4.5							
5.0							
5.5							
6.0	6.2						no water encountered
6.5						large rock difficult to dig	
7.0							

NOTES

TD= 6.2'

1) TP 15 and 16 similar pond profiles

2) Test Pit Backfilled + Compacted

K - Sample collected, Composit of Material

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME: RICO CO PROJECT NO.: ST LOUIS PONDS	BORING NUMBER: TP-16	COORDINATES OR LOCATION: Lot
LOGGED BY: CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH: 0 Hour (ENCOUNTERED) GWL DEPTH: (STATIC)
DRILLING METHOD: BACKHOE TEST PIT	HOLE DIAMETER: PIT	FLUID USED: NA
		DATE STARTED: 10-13-08 DATE COMPLETED: 10-13-08
CASING TYPE AND SIZE: NA SCREEN TYPE AND SIZE:		FROM ____ A.G.S TO ____ B.G.S FROM ____ TO ____ B.G.S

DEPTH (')	SAMPLE TYPE AND # NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.0						Gravel on surface	
1.0						Light Brown sand, silty clay	
1.5						with some sand, large	
2.0						rocks (2" to ~48")	
2.5						~30-35% Rock	
3.0							
3.5							
4.0							
4.5							
5.0							
5.4	①						
6.0						Large rocks, many different excavation	No water encountered

NOTES

TD= 5.4'

1) TP-16 & TP-15 similar soil profiles

2) Test Pit Backfilled & Compacted

3 - Sample collected Composit of Material

ANDERSON

BORING LOG

PAGE ____ OF ____

PROJECT NAME: KCO Co PROJECT NO: St Louis Park	BORING NUMBER: TP-17	COORDINATES OR LOCATION:
LOGGED BY: CA CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH 0 None (ENCOUNTERED) GWL DEPTH (STATIC)
DRILLING METHOD: Back Hoe Test Pit	HOLE DIAMETER: NA — FLUID USED: NA	DATE STARTED: 10-13-08 DATE COMPLETED: 10-13-08
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA		FROM ____ A.G.S TO ____ B.G.S FROM ____ TO ____ B.G.S

DEPTH (ft)	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5 1.0 1.5 2.0 2.5	2.7					Ground on surface, Brown sandy silt with some clay and gravel and Rock (2" to 14") Rock content 25%	
3.0 3.5 4.0	4.0					very dark BROWN silty clay with organic material, little to no rock, soil moist	
4.5 5.0 5.5 6.0	6.4					Brown silty clay with some large rock (6" - 14") N 5% soil moist	NO WATER ENCOUNTERED
6.5 7.0							

NOTES

TD= ____

1) Test Pit Back Filled & Compacted

2) Sample Collected, Composit of Material

TP-17

ANDERSON

BORING LOG

PAGE ____ OF ____

PROJECT NAME: Rico Co PROJECT NO: St. Louis Ponds	BORING NUMBER: TP-18	COORDINATES OR LOCATION:
LOGGED BY: RC CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH: 0 ND (ENCOUNTERED) GWL DEPTH: (STATIC)
DRILLING METHOD: Backhoe Test Pit	HOLE DIAMETER: NA	FLUID USED: NA
		DATE STARTED: 10-14-08 DATE COMPLETED: 10-14-08
CASING TYPE AND SIZE: --- SCREEN TYPE AND SIZE: NA		FROM ____ AGS TO ____ BGS FROM ____ TO ____ BGS

DEPTH (ft)	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5						Brown clayey silt with gravel and Cobbles (3" - >12" ø) ~10% rock mix	
1.0							
1.5							
2.0							
2.5							
3.0							
3.5							
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							
7.0							

TD= 7.0

NOTES

1) Test Pit Backfilled & Compacted

2. Sample Collected, Composit of Material

ANDERSON

BORING LOG

PAGE _____ OF _____

PROJECT NAME: Rico CO- PROJECT NO: St. Louis Ponds	BORING NUMBER: TP-19	COORDINATES OR LOCATION
LOGGED BY: KC CHECKED BY:	SURFACE ELEVATION	GWL DEPTH: 0 (ENCOUNTERED) (No water) GWL DEPTH (STATIC)
DRILLING METHOD: Excavator Test Pit	HOLE DIAMETER: NA	FLUID USED: N/A
		DATE STARTED: 10-13-08 DATE COMPLETED: 10-13-08
CASING TYPE AND SIZE: NA SCREEN TYPE AND SIZE:		FROM _____ AGS TO _____ BGS FROM _____ TO _____ BGS NA

DEPTH ( )	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5						Brown clayey silt with gravel and rock (2 - 10 cm), Moist 25 - 30% gravels	
1.0							
1.5							
2.0							
2.5							
3.0							
3.5							
4.0							
4.5	4.4					Concrete foundation	refusal
5.0							
5.5							
6.0							
6.5							
7.0							

NOTES

TD= _____

1/ Test Pit Back filled & Compacted

X/ Sample Collected, Composit of Material

ANDERSON

BORING LOG

PAGE ____ OF ____

PROJECT NAME: Rico Co PROJECT NO: St. Louis Ponds	BORING NUMBER: TP-20	COORDINATES OR LOCATION:
LOGGED BY: KC CHECKED BY:	SURFACE ELEVATION:	GWL DEPTH: D (ENCOUNTERED) GWL DEPTH: Mount (STATIC)
DRILLING METHOD: Backhoe Test Pit	HOLE DIAMETER: NA	FLUID USED: NA
DATE STARTED: 10-14-08 DATE COMPLETED: 10-14-08		
CASING TYPE AND SIZE: SCREEN TYPE AND SIZE: NA	FROM ____ A.G.S TO ____ B.G.S FROM ____ TO ____ B.G.S.	

DEPTH	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5						Brown clayey silt with gravel and some cobbles (6" - 12" ø) 5-10% Rock Lens of Red calcine tailings @ 3'	

NOTES

TD= 7.5

Piece of Concrete foundation W. end of pit at 2' deep
metal debris found in zone containing the calcine tailings

Test Pit Backfilled & Compacted

Sample Collected, Composit of Material

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME: Reco Co	BORING NUMBER: TP 21	COORDINATES OR LOCATION:
PROJECT NO: ST LOUIS AVNUE		
LOGGED BY: KC	SURFACE ELEVATION:	GWL DEPTH: 0 (ENCOUNTERED)
CHECKED BY:		GWL DEPTH: none (STATIC)
DRILLING METHOD: BACKHOE TEST PIT	HOLE DIAMETER: NA	FLUID USED: NA
DATE STARTED: 10-13-23		
DATE COMPLETED: 10-13-23		
CASING TYPE AND SIZE: NA	FROM ____ AGS TO ____ BGS: NA	
SCREEN TYPE AND SIZE:	FROM ____ TO ____ BGS	

DEPTH (')	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5						Brown Silty sand and gravel	
1.0	(1)						
1.5							
2.0	2.0						
2.5	(2)					White and yellow crushed rock	
3.0	3.0					Mine waste (3-6" @ rock 60% rock	
3.5							
4.0						Brown Silty sand with gravel	
4.5						and cobbles 10-15% rock	
5.0							
5.5	(3)						
6.0							
6.5							
7.0	7.0					TD 7'	No water encountered
7.5							

NOTES

TD= 7.0

1) Test Pit Backfilled + Compacted

2) Sample collected, Composit 2 Material

ANDERSON

BORING LOG

PAGE 1 OF 1

PROJECT NAME: Rico, Co	BORING NUMBER: TP 22	COORDINATES OR LOCATION:
PROJECT NO: 57 Louis Ponds		
LOGGED BY: KC/CS	SURFACE ELEVATION:	GWL DEPTH: ~5 no water (ENCOUNTERED)
CHECKED BY:		GWL DEPTH: (STATIC)
DRILLING METHOD: Back hoe Test Pit	HOLE DIAMETER: NA	FLUID USED: None
		DATE STARTED: 10-13-08
		DATE COMPLETED: 10-13-08
CASING TYPE AND SIZE:		FROM _____ A.G.S TO _____ B.G.S.
SCREEN TYPE AND SIZE: NA		FROM _____ TO _____ B.G.S. NA

DEPTH (')	SAMPLE TYPE AND NUMBER	SAMPLE DEPTH INTERVAL	BLOW COUNT	RECOVERY LENGTH (%)	PROFILE	DESCRIPTION	WELL CONSTRUCTION SUMMARY
0.5	1	X				Crushed stone and solidified Red Sandy tailings - caliche	
1.0	1.0						
1.5	2	X				Orange silty sand with gravel & cobbles (more rock)	
2.0	2.0						
2.5	3	X				Brown silty sand with gravel & cobbles	
3.0							
3.5	5.0						Large rocks, could not remove - refusal
4.0						TD ↑	No water encountered
4.5							
5.0							

NOTES

TD= 5.0

1) Steel pipe in trench, running N/S at 1.2' deep. Pipe 9" Ø
2) Test Pit Back filled + Compacted
X - Sample collected, Composited & Mailed

SEH 2004

TP-2004A

10:00 AM EXCAVATE TP-2004A

0'- 10.5' CAT 436B RUBBTIRE BACKHOE

COLLUVIUM, CLAYEY SAND AND GRAVEL, DARK ATEMISH GRAY (3/1), BOULDERS TO 2.0', MOIST, MODERATELY DENSE BOULDERS AND COBBLES SUBROUNDED TO ANGULAR, ESTIMATE 30% >2"

TP-2004B

TP-2004B

0 - 7.0' COLLUVIUM.

CLAYEY SAND AND GRAVEL BROWN (4/3), MOIST, MOD DENSE, LOW PLASTISITY FINES, BOULDERS TO 1.0', COBBLES AND BOULDERS ANGULAR, TO SUBANGULAR ESTIMATE 20% > 2"

TP-2004C

TP-2004C

0 - 5.0' COLLUVIUM

CLAYEY SAND AND GRAVEL DARK BROWN (3/2), SLIGHTLY MOIST, FINES LOW TO MOD PLASTICITY, BOULDERS TO 3.0' ESTIMATE 15% > 2". COBBLES ANGULAR TO SUBANGUCAR

TP-2004D

TP-2004D
0.0 - 1.5' TOPSOIL
1.5 - 6.0' COLLUVIUM
SILTY GRAVELLY SAND,
DARK REDDISH BROWN (3/4),
SLIGHTLY MOIST, LOOSE,
BOULDERS TO 1.0', SUBROUNDED
TO SUB ANGULAR. ESTIMATE
5-10% > 2"

TP-2004E

TP-2004E
N. OF POND 18 IN CALCINE
TAILINGS
0'-9.0' Calcine Tailings
9.0-12.0' RIVER COBBLES
WATER @ 8.0'

TP-2004F

TP-2004F
EAST OF POND 18
0-0.5' FILL
0.5-12.0' CALCINE TAILINGS

TP-2004G

TP-2004G
EAST OF POND 18
0-0.5 FILL
0.5-12.0' Calcine tailings

TP-2004 H
POND 16/17
0-4.0' FILL
4.0'-12.0' Calcine-tailing
GW@ 11.0'

TP-2004 H

TA-2004 I
POND 16-17
0-12.0' Calcine Tailings
~~GW~~ GW@ 12.0'

3 SAMPLES EACH PIT

TP-2004 I

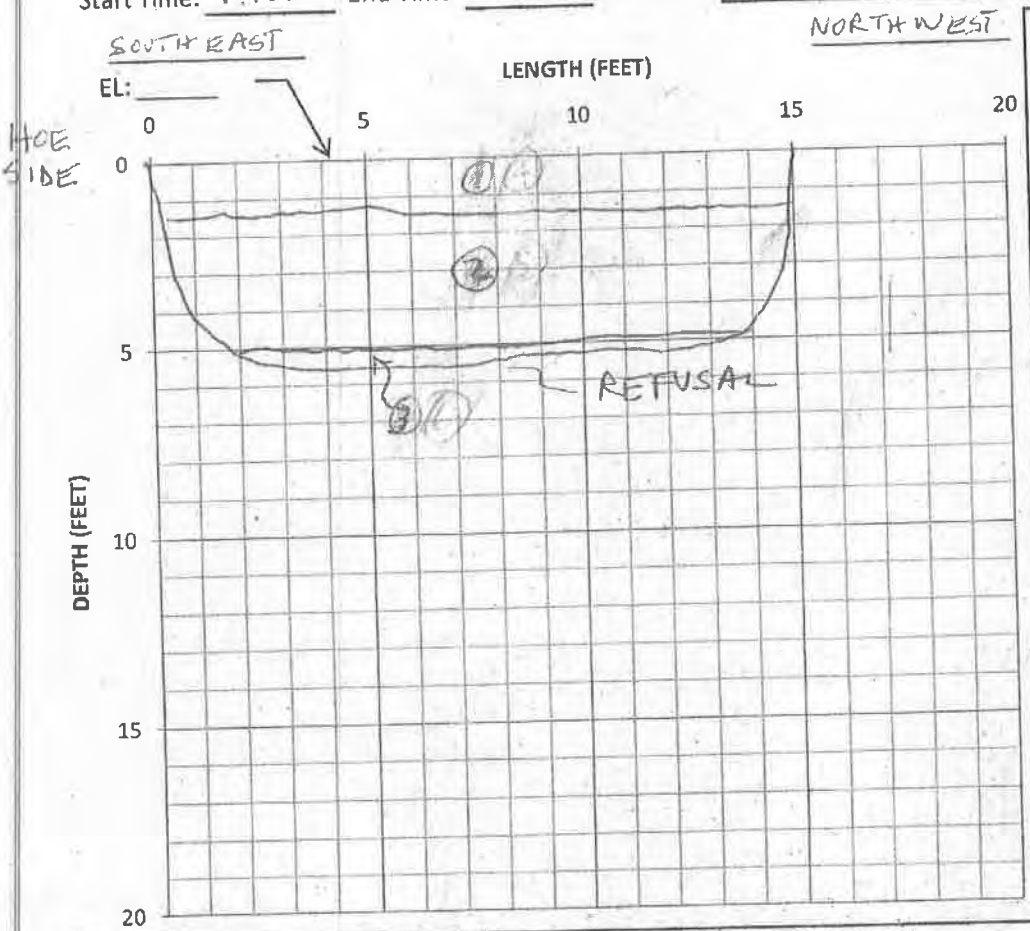
TEST PIT LOG

TEST PIT #: TP2011-1

PROJECT: Rico St. Louis Ponds
NO:
DATE: 21 SEP 11
LOGGED BY: ACJ

WEATHER: SUNNY 65° F
EXCAVATION METHOD: CAT 330C LONGSTICK
LOCATION: POND 13 POND PERIMETER, IN POND, NEAR SE CORNER

Start Time: 1:10 PM End Time: 1:25 PM Note:



NOTES/SAMPLES

1 1 GAL BAG MAT ① 0-1.5'
1 1 GAL BAG MAT ② 1.5-5'
2 5 GAL BUCKETS MAT ③ 5'-6' 3" - ONLY

SOIL TYPE	SOIL DESCRIPTION
①	PRECIPITATED SOLIDS, MIXED W/ OTHER SOIL, 5YR 5/3 DARK REDDISH BROWN, SANDY SILT W/ SCATTERED GRAVEL UP TO ½" LOW PLASTICITY, SAND MOSTLY FINE, SOLIDS IN SOME CASES FORM V. SOFT SAND-SIZED PARTICLES, V. SOFT
②	CALCINES, SILTY SAND, WET, NO MUNSELL COLOR AVAIL – DARK REDDISH PURPLE, NON-PLAST, TENDS TO LIQUEFY AND FLOW WHEN DISTURBED IN PIT, THEN SET HARD AS WATER RELEASED. V. LOOSE WHEN SATURATED
③	CLAYEY, SANDY GRAVEL W/ COBBLES AND BOULDERS TO 12" EST. 10-15% COBBLES AND BOULDERS, 3/10GY, DARK GREENISH GRAY, ANGULAR TO SUBROUNDED, GRAVEL AND COBBLES HARD TO V. HARD

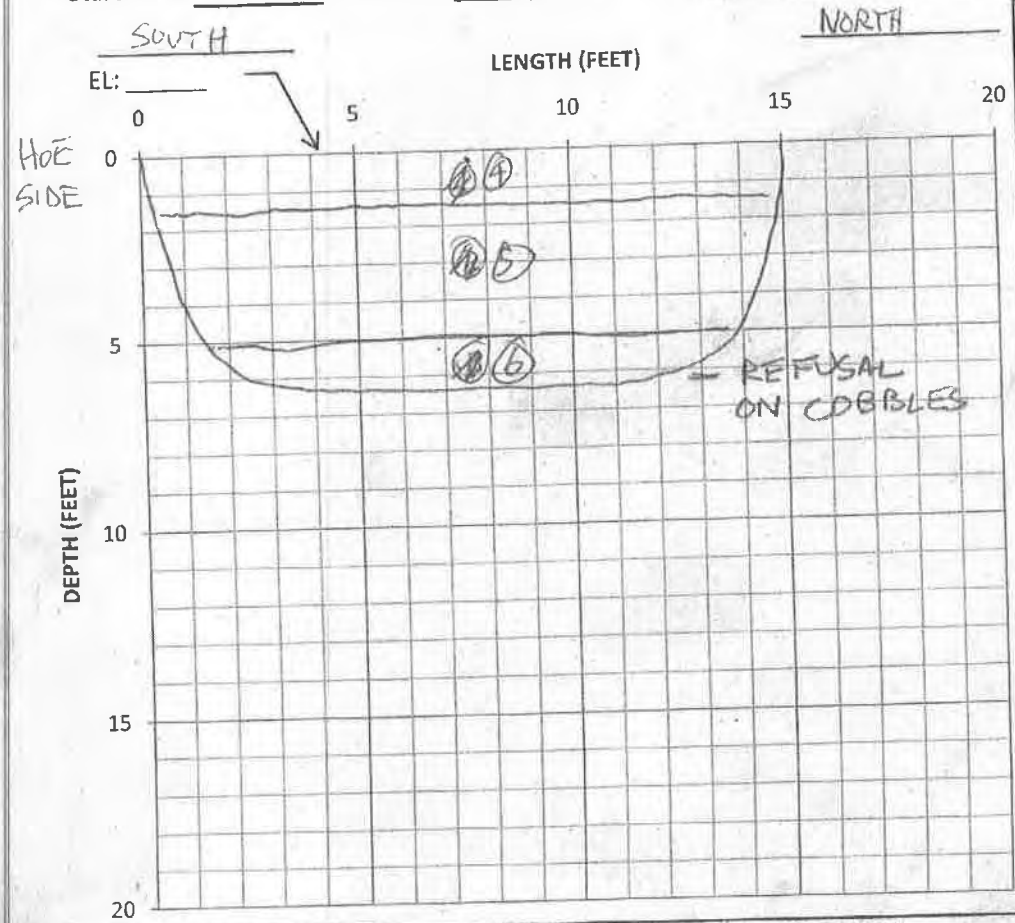
TEST PIT LOG

TEST PIT # TP2011-2

PROJECT: Rico St. Louis Ponds
NO:
DATE: 21 SEP 11
LOGGED BY: ACJ

WEATHER: SUNNY 65°
EXCAVATION METHOD: CAT 330 C LONG
LOCATION: POND 13, IN POND NEAR DECANT, SOUTHWEST CORNER

Start Time: 1:25 PM End Time: 2:10 PM Note:



NOTES/SAMPLES

1 GAL BAG SAMPLE ④, 0-1.5'
1 GAL BAG SAMP. ⑤ 1.5'-5.0'
2 5GAL BUCKETS MATL ⑥ 5-6'

SOIL TYPE	SOIL DESCRIPTION (MIXED WITH OTHER SOIL)
④	PRECIPITATED SOLIDS, MOIST, 5YR 3/3 DARK REDDISH BROWN, SANDY SILT W/ SCATTERED GRAVEL, LOW PLASTICITY, SAND MOSTLY FINE, SCATTERED UP TO ½" AND MED AND COARSE. V. SOFT.
⑤	CALCINES, ~~SANDY SILT~~ SILTY SAND, WET, NO MUNSELL COLOR AVAILABLE DARK REDDISH PURPLE, & NON-PLASTIC, TEND TO LIQUEFY AND FLOW WHEN DISTURBED IN PIT, THEN SET HARD. V. LOOSE. WHEN SATURATED
⑥	SANDY SILT W/ SCATTERED GRAVEL UP TO ¼", WET, 3/10BG DARK GREENISH GRAY, LOW PLASTICITY, GRAVEL ANGULAR.

TEST PIT LOG

TEST PIT # TP2011-4

PROJECT: Rico St. Louis Ponds
NO:
DATE: 21 SEP 11
LOGGED BY: ACJ

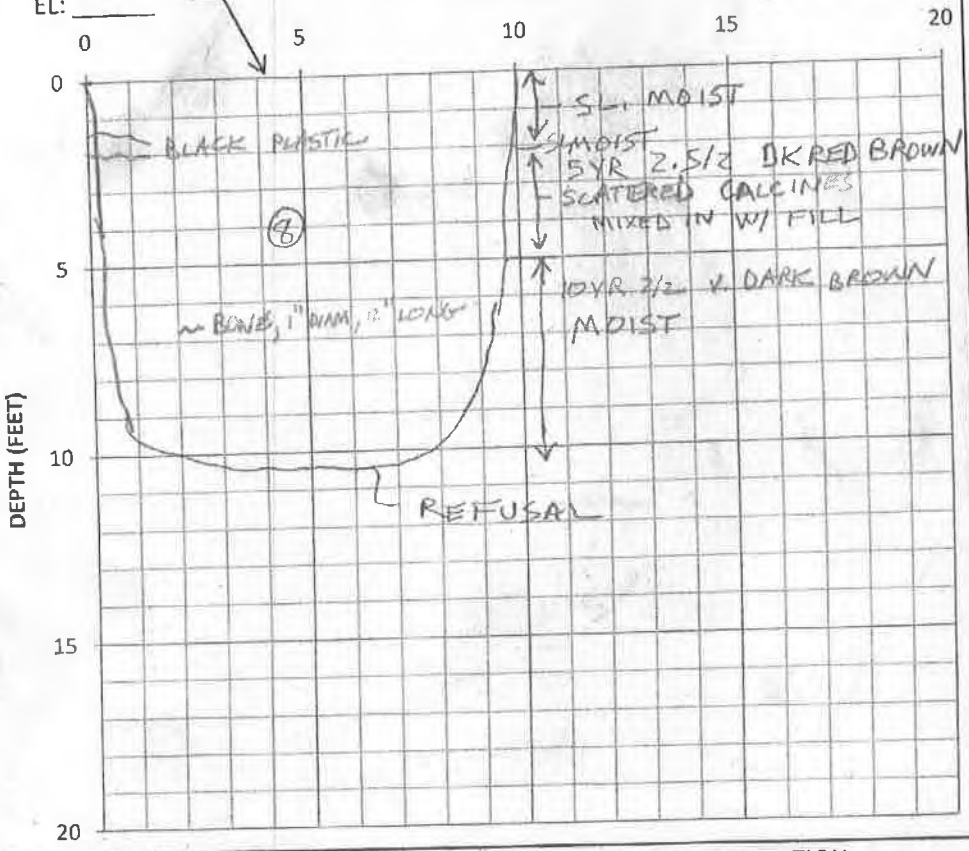
WEATHER: SUNNY, 65°
EXCAVATION METHOD: CAT 308C CR MINI EX
LOCATION: POND 13 DIKE, NEAR MIDDLE

Start Time: 3:05 PM End Time: 3:45 PM Note:

SOUTHWEST

NORTH EAST
HOE SIDE

EL: _____



NOTES/SAMPLES

NUMEROUS LARGE ROCKS SLOW DIGGING 2'-8'

OPERATOR REPORTS V. HARD DIGGING 8'

3 5 GALLON BUCKETS MATL (8), ~3" (APPROX) ONLY 0'-10'

SOIL TYPE	SOIL DESCRIPTION
(4)(8)	EMBANKMENT FILL, SEE ABOVE FOR MOISTURE AND COLOR, BOULDERS TO 18", SUB ANGULAR TO ROUNDED, ~3% BOULDERS, ~10% COBBLES, ~40% GRAVEL, ~30% SAND. GRAVEL AND COBBLES MOD HARD - V. HARD.

TEST PIT LOG

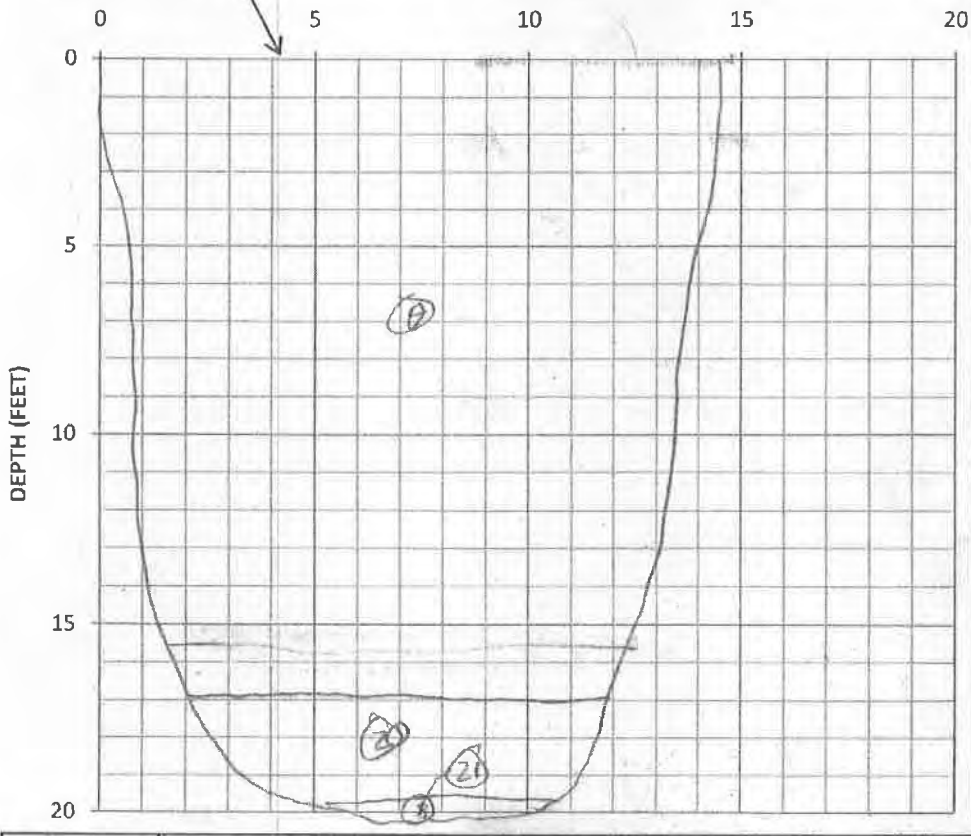
TEST PIT #: TP2011-8

PROJECT: Rico St. Louis Ponds
NO:
DATE: 22 SEP 11
LOGGED BY: ACJ

WEATHER: SUNNY, 60°F
EXCAVATION METHOD:
LOCATION: POND 16/17 DIKE

Start Time: 10:15 AM End Time: Note:

EAST
EL:
LENGTH (FEET)
WEST
TOE SIDE



NOTES/SAMPLES

2 5 GAL BUCKETS
0'-17'
-3" ONLY MAT (19)

1 1 GAL BAG
17-19.5'
MAT (20)

SOIL TYPE	SOIL DESCRIPTION — OXIDIZED
(19)	EMBANKMENT FILL, LENSES OF ~~WASTE~~ ROCK, SANDY GRAVEL/ ~~GRAVELLY~~ SAND W/ CLAY AND BOULDERS TO 15" LENSES OF CALCINE, VISIBLE STRATIFICATION, OVERALL COLOR 5YR 3/2 DARK REDDISH BROWN, SUB ANGULAR TO ANGULAR, ~3% BOULDERS 10% COBBLES, 30% GRAV., 35% SAND, ~20% FINES (SILT W/ SOME CLAY) MOST GRAVEL + COBBLES MOD HARD TO HARD W/ EXCEPTION OF OXIDIZED WASTROCK, WHICH BREAKS EASILY (SOFT).
(20)	WASTE ROCK OR ALLUVIUM (PROBABLE), MOIST, NUMEROUS LIVE AND DEAD ROOTS, UP TO 3/8" IN DIAM., LENSES OF HIGHLY WEATHERED ROCK (SEE PHOTO, (SILTY CLAY), ROCK PEN: 2.4 kg 20 MM TIP, 1.2 10 mm TIP., MOD TO HIGH PLASTICITY
21 (1) –	ALLUVIUM?, SILTY SAND, MOIST, V. SIMILAR TO MAT (1), TP 2011-7, ROOTS TO 3/8"

TEST PIT LOG

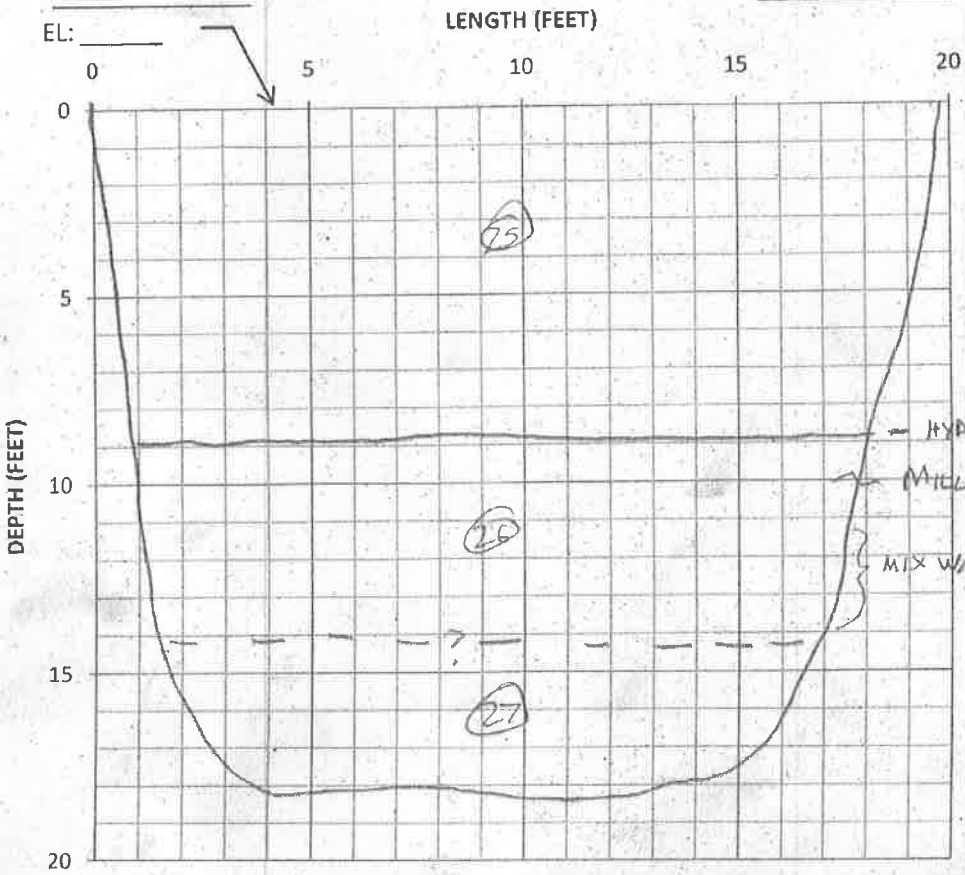
TEST PIT #: TP-2011-10

PROJECT: Rico St. Louis Ponds
NO:
DATE: 22 SEP 11
LOGGED BY: ACJ

WEATHER:
EXCAVATION METHOD:
LOCATION: DUE EAST OF SOIL LEADS REPOSITORY, NEAR FLOOD DIKE

Start Time: 12:20 PM End Time: Note:

EL:



NOTES/SAMPLES

2 5GAL BUCKETS
MAT 25
0'-9'
1 1GAL BAG
9'-11', MAT 26

SOIL TYPE	SOIL DESCRIPTION
(1) (25)	
(26)	CALCINES, MOIST, SIMILAR TO CALCINES AROUND SITE, SILTY SAND/SANDY SILT, NON-PLASTIC, DK REDDISH PURPLE. BELOW 11.0', APPEARS TO BE MIXED W/ SUBANGULAR TO ANGULAR WASTE ROCK, UP TO 50% COBBLE, BOULDER AND GRAVEL CONTENT IN SOME LAYERS
(27)	PROBABLE ALLUVIUM, INFILTRATED W/ CALCINES, BOULDERS, DK REDDISH PURPLE UP TO 24", SUBROUNDED TO ROUNDED, <3% BOULDERS,

TEST PIT LOG

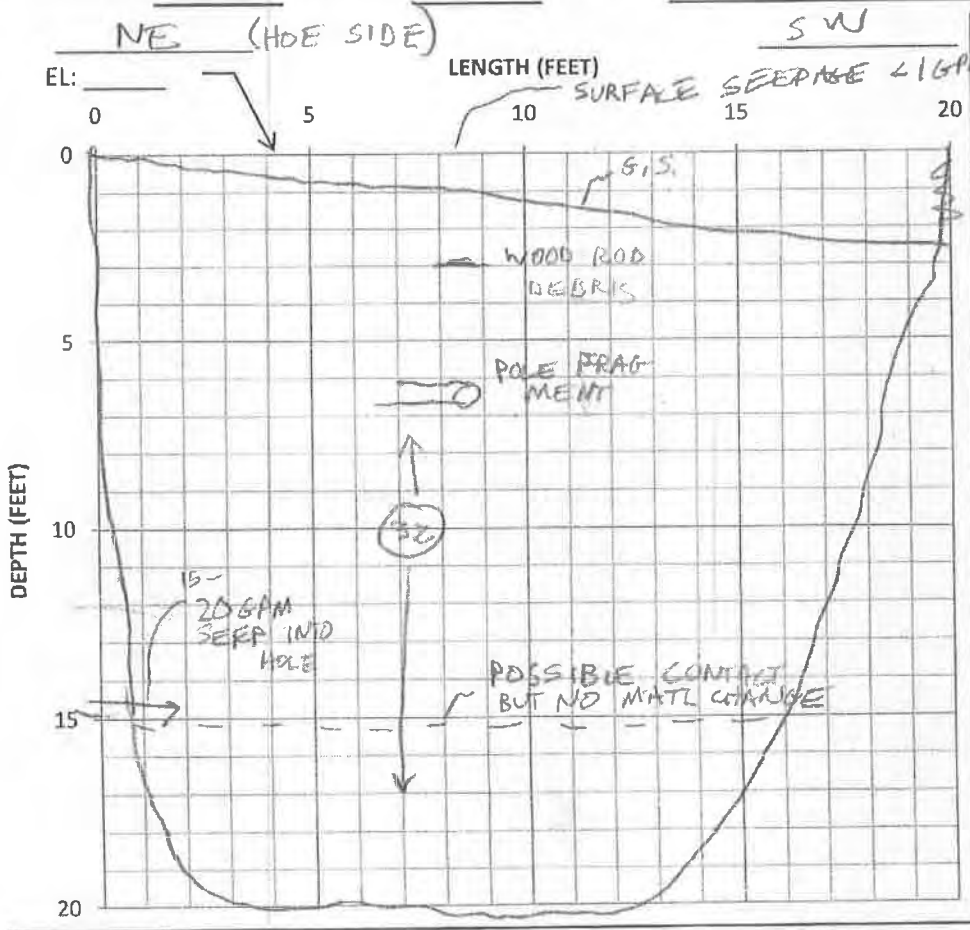
PROJECT: Rico St. Louis Ponds	DATE: 22 SEP 11
NO:	LOGGED BY: ACJ

TEST PIT #: TP 2011-12

WEATHER: SUNNY, 65° EXCAVATION METHOD:

LOCATION: NORTH STACKED REPOSITORY, SE CORNER

Start Time: 1:50 PM End Time: 2:35 PM Note:



NOTES/SAMPLES

- LARGE HOLE CAVE FROM 0-4' @ HOLE DEPTH 8' ON NW SIDE, OPERATOR MOVING TO SW SIDE
- SE SIDE OF HOLE CAVE @ 9'

2 5 GAL BUCKETS 3" MINUS ONLY 0-20' MAT (32)

SOIL TYPE	SOIL DESCRIPTION
(1) (32)	FILL (LIKELY), REGRADED COLLUVIUM/LANDSLIDE DEBRIS, MOIST TO WET, STRATIFIED, BOULDERS TO 36", 10YR 3/3 (V. DARK BROWN), EST. 5-10% BOULDERS, 10-15% COBBLES, 20% GRAVEL, 20% SAND 35% CLAY FINES, MODERATELY PLASTIC FINES, GRAVEL + COBBLES MOD HARD TO HARD, APPEAR TO BE HERMOSA-DERIVED.

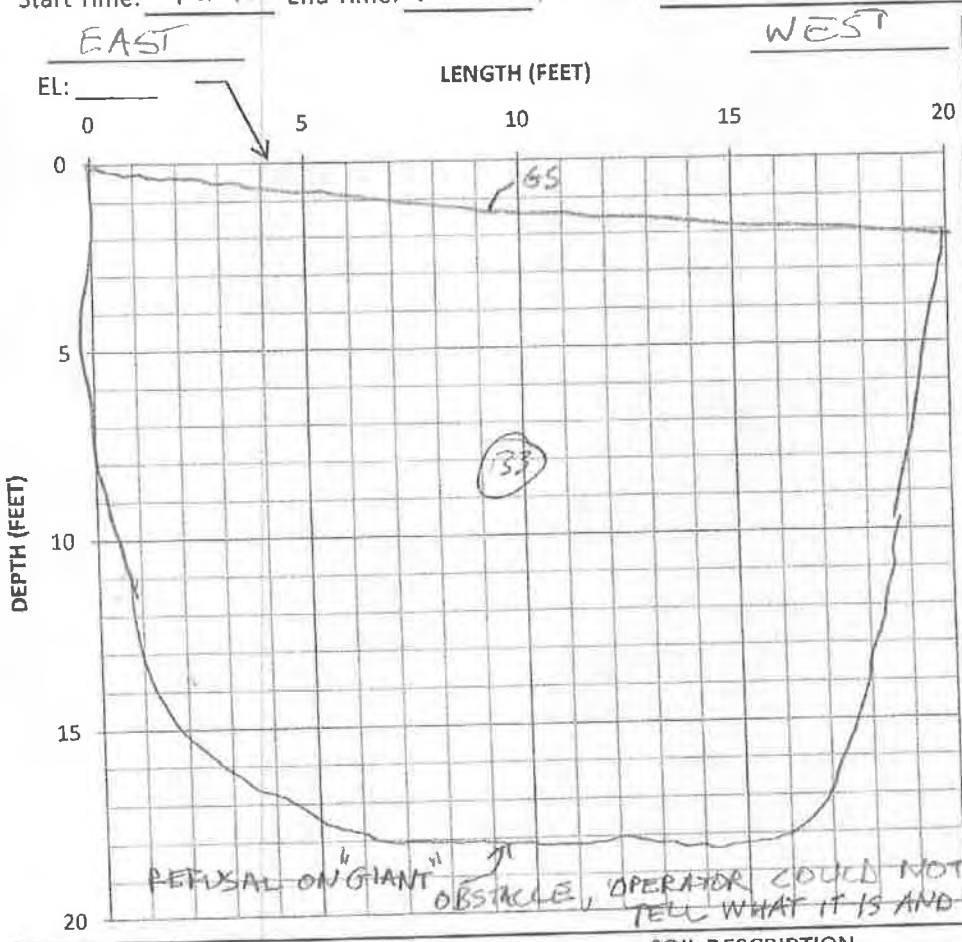
TEST PIT LOG

PROJECT: Rico St. Louis Ponds	DATE: 22 SEP 11
NO:	LOGGED BY: ACJ

TEST PIT # TP 2011-13

WEATHER: SUNNY, 75°F
EXCAVATION METHOD:
LOCATION: NORTH STACKED REPOS. ~ MIDWAY BETWEEN 2 LOWER (WEST) BORE HOLES.

Start Time: 2:40 PM End Time: 3:10 PM Note:



NOTES/SAMPLES

VISIBLE SEEPAGE NOTED

2 5GAL BUCKETS MAT (33) 0'-18'

GIANT HOLE CAVE 0'-15' JUST PRIOR TO AFTER COMPLETION

SOIL TYPE	SOIL DESCRIPTION
(1) (33)	SAME MATL AS TP 2011-12, MAT (32), PRIMARILY MOIST, NO WET SEEMS NOTED

TEST PIT LOG

TEST PIT #: TP2011-14

PROJECT: Rico St. Louis Ponds
NO:
DATE: 22 SEP 11
LOGGED BY: ACJ

WEATHER: 65°F SUNNY
EXCAVATION METHOD:
LOCATION: NORTH STACKED REPOS BETWEEN 2 NORTH BOREHOLE LOCATIONS

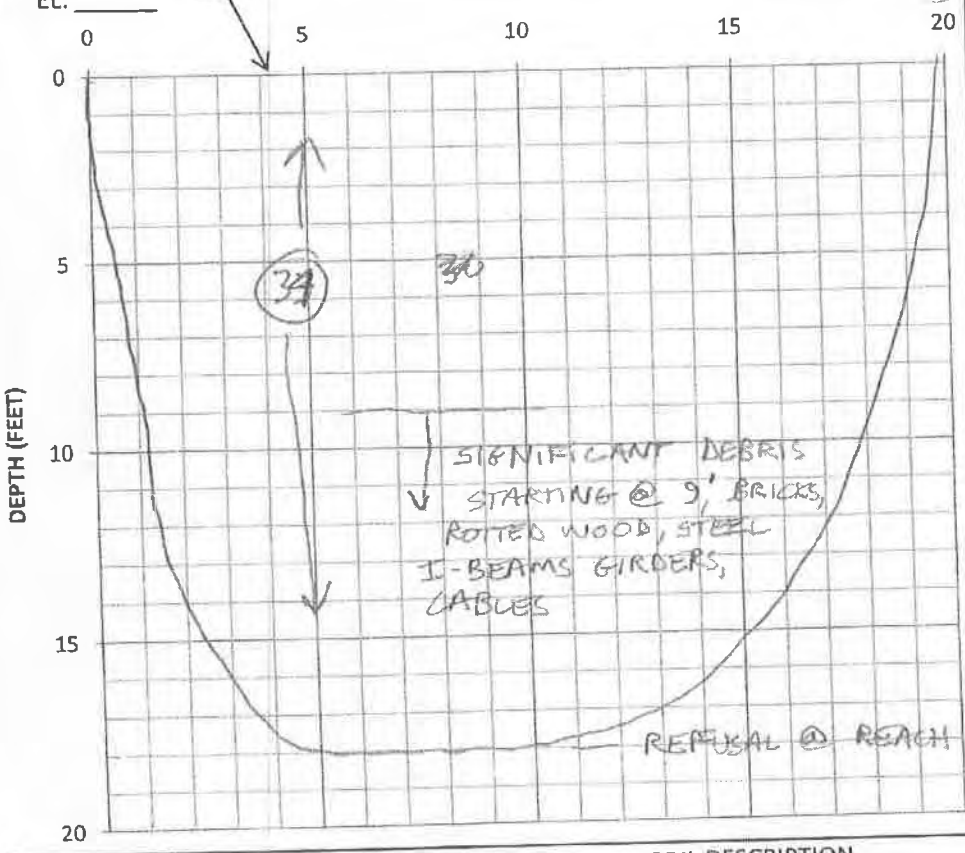
Start Time: _____ End Time: _____ Note: _____

SAZ 4755

WEST

EL: _____

EAST (HOE SIDE)



NOTES/SAMPLES

SOIL TYPE	SOIL DESCRIPTION
~~34~~ 34	SAME MATERIAL AS TP 2011-13, MATERIAL (33), EXCEPT FOR DEBRIS AS NOTED

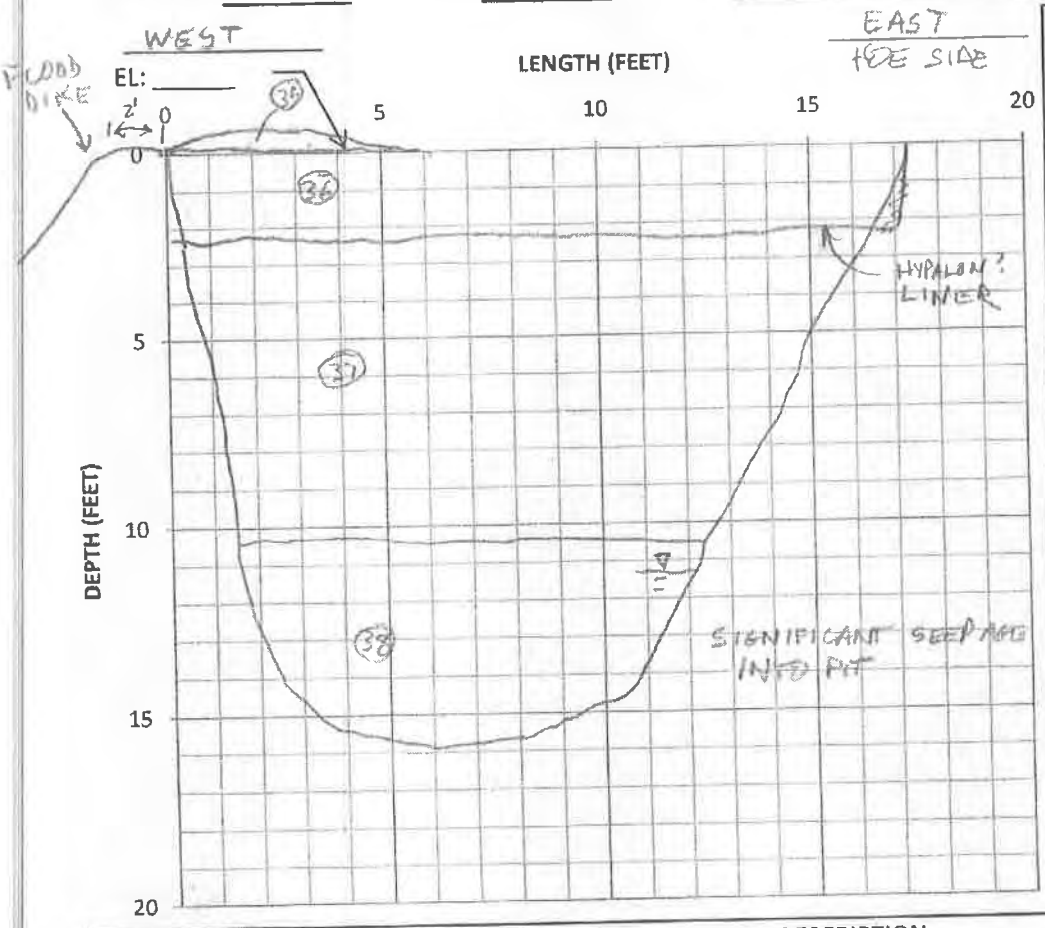
TEST PIT LOG

TEST PIT #: TP 2011-15

PROJECT: Rico St. Louis Ponds
NO:
DATE: 23 SEP 11
LOGGED BY: ACJ

WEATHER: SUNNY, 40°F
EXCAVATION METHOD:
LOCATION: FLOOD DIKE, N. END OF SITE,

Start Time: 9:55 AM End Time: 10:35 AM Note:



NOTES/SAMPLES

1 5 GAL BUCKET MAT 36

2 5 GAL BUCKETS MAT 37 *

1 5 GAL BUCKETS MAT 38 *

* - ~3" (APPROX) ONLY

SOIL TYPE	SOIL DESCRIPTION
(1)	
(39)	FILL, SANDY GRAVEL, PROCESSED MATL., MAX SIZE = 3", ~40% GRAVEL, 40% SAND, 10% SILT FINES, ANGULAR TO ROUNDED.
(36)	FILL, CLAYEY SANDY GRAVEL, MAX SIZE = 2", ~35% GRAVEL, 30% SAND, 35% CLAY FINES, FINES MOD. PLASTIC, GRAVEL SUB ROUNDED TO SUB ANGULAR W/ SOME ANGULAR PARTICLES. 1GLEY 2.5 N (BLACK)
(37)	FILL, CLAEY SANDY GRAVEL, BOULDERS TO 36", ~15% BOULDERS, ~15% COBBLES, ~30% GRAVEL, ~25% SAND, 15% CLAY
(38)	

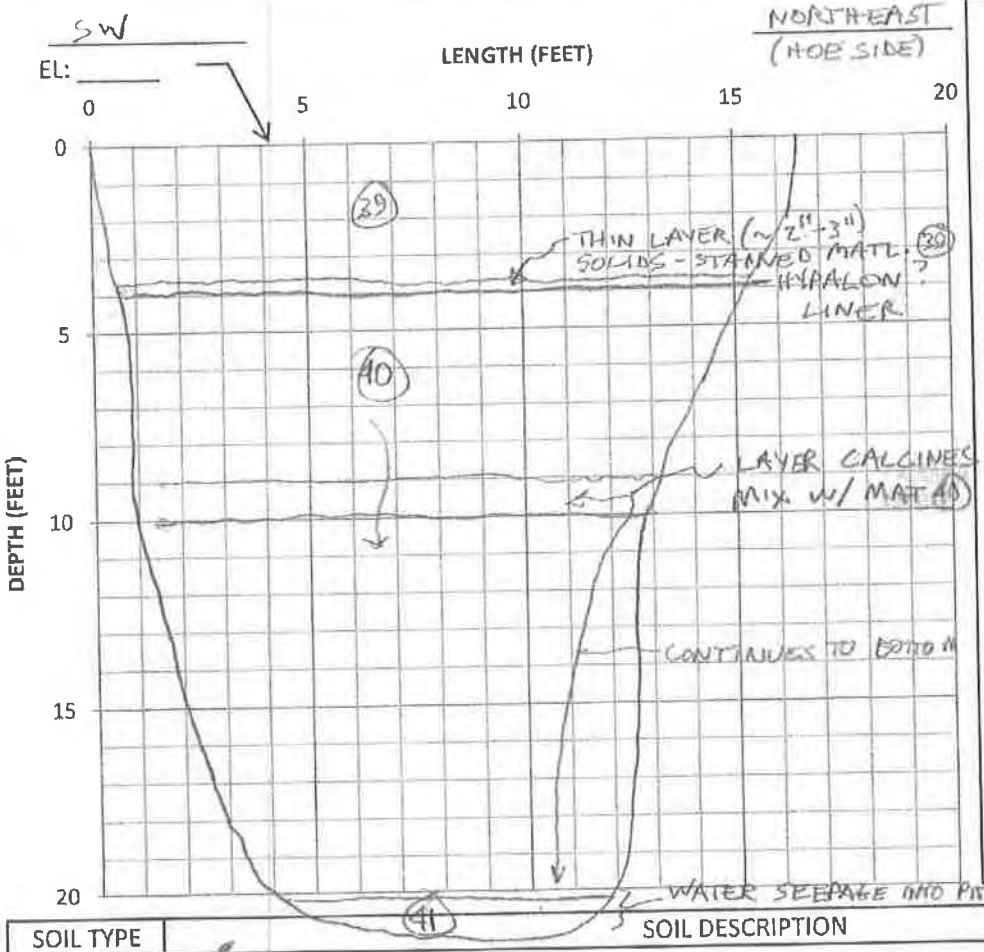
TEST PIT LOG

TEST PIT #: TP2011-16

PROJECT: Rico St. Louis Ponds
NO:
DATE: 23 SEP 11
LOGGED BY: ACJ

WEATHER: 50°F SUNNY
EXCAVATION METHOD:
LOCATION: MIDDLE OF HEAP LEACH AREA

Start Time: 10:45AM End Time: _____ Note: _____



NOTES/SAMPLES

SOIL TYPE	SOIL DESCRIPTION
(1)	

TEST PIT LOG

TEST PIT #: TP2011-17

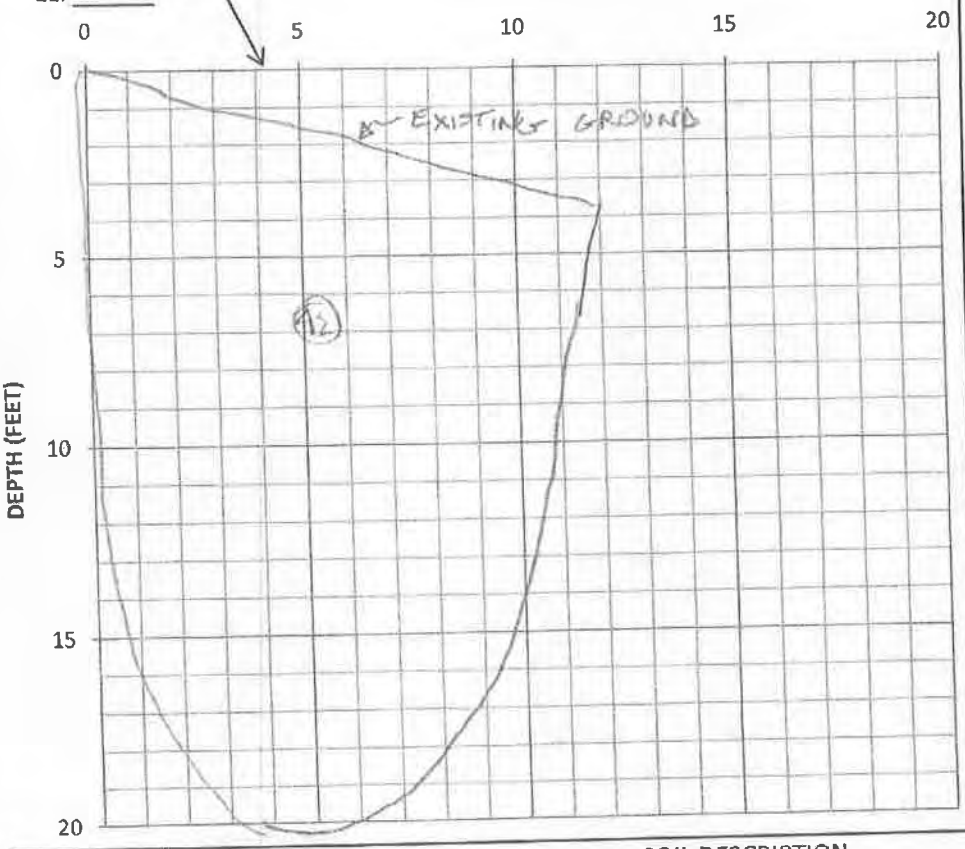
PROJECT: Rico St. Louis Ponds
NO:
DATE: 23 SEP 11
LOGGED BY: ACJ

WEATHER: SUNNY, 65°F
EXCAVATION METHOD:
LOCATION: SOUTH STACKED REPOS, N. END

Start Time: 12:30 PM End Time: _____ Note: _____

EAST (HOE) WEST

EL: _____



NOTES/SAMPLES

- HOE SWITCHING TO WEST END OF PIT @ ~8'
- 2 5GAL BUCKETS MAT (A2) 3"- ONLY
- FREQUENT SLOUGHING OF HOLE (SEE PHOTOS FOR EXTENTS

SOIL TYPE	SOIL DESCRIPTION
(1) (A2)	COLLUVIUM OR POSSIBLE FILL CLAYEY SANDY GRAVEL, MOIST, 10YR 3/3 DARK BROWN, BOULDERS TO 18", ~3% BOULDERS, ~20% COBBLES, ~30% GRAVEL, ~30% SAND, ~25% CLAY FINES, FINES MOD PLASTIC, PREDOM. SUB ANGULAR TO ANGULAR GRAVEL/COBBLES, WITH SCATTERED SUBROUNDED, MOD. HARD TO HARD ROCK., PROBABLE HERMOSA FM DERIVED. BELOW ~8', ALTERNATING LAYERS OF HIGHER COBBLE AND BOULDER CONTENT (SEE PHOTOS).

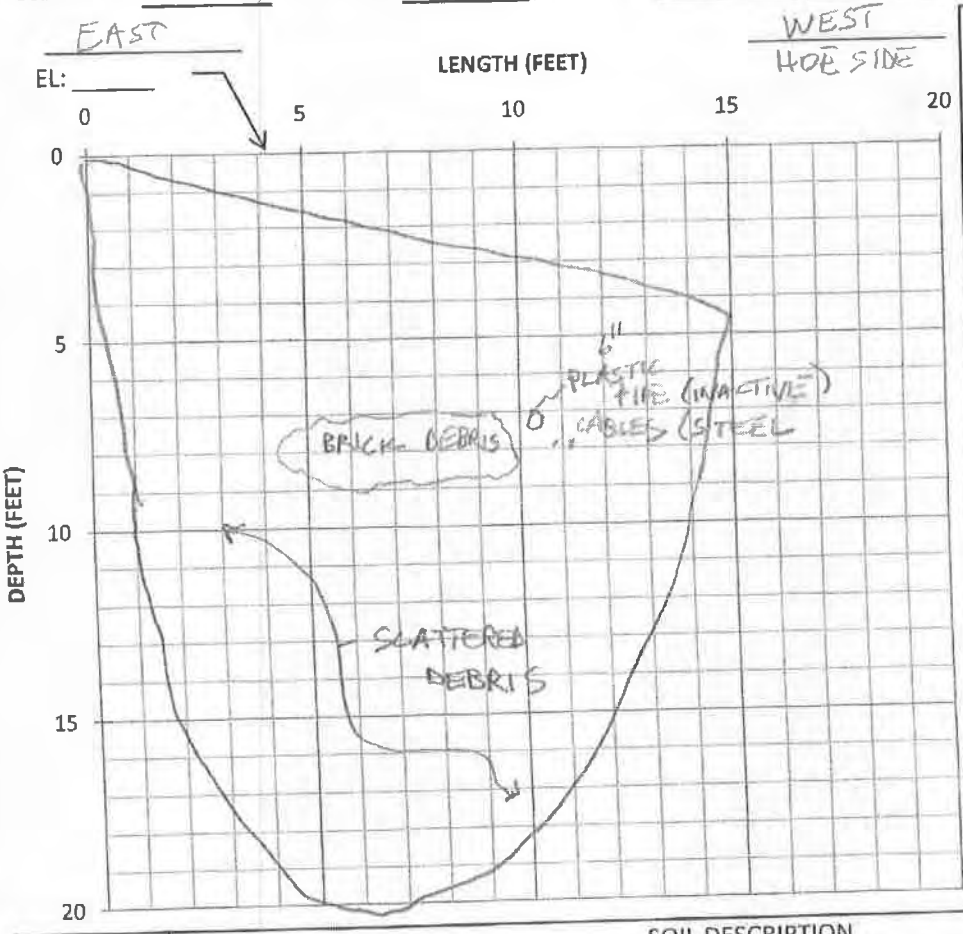
TEST PIT LOG

TEST PIT # TP 2011-18

PROJECT: Rico St. Louis Ponds
NO:
DATE: 23 SEP 11
LOGGED BY: ACJ

WEATHER: 65°F SUNNY
EXCAVATION METHOD:
LOCATION: SOUTH STACKED REFOS, MIDDLE

Start Time: 1:30 PM End Time: 2:05 PM Note:



NOTES/SAMPLES

2 5 GAL BUCKETS
0-20'
MAT (43)

SOIL TYPE	SOIL DESCRIPTION
(44) (43)	COLLUVIUM/~~FILL~~ COLLUVIUM OVER FILL, SAME AS MAT (42), EXCEPT FOR DEBRIS AS NOTED, 24" MAX BOULDER SIZE, WHITE IN PHOTOS IS DISINTEGRATED BRICK

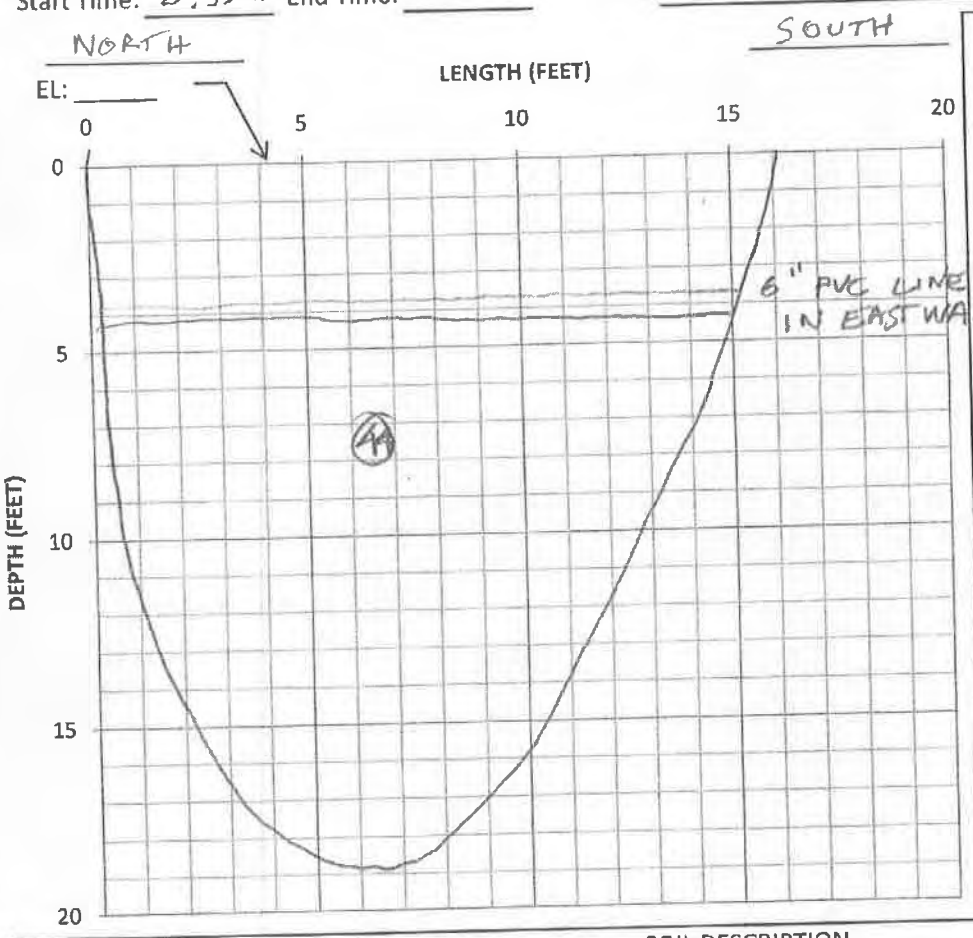
TEST PIT LOG

TEST PIT # TP2011-19

PROJECT: Rico St. Louis Ponds
NO:
DATE: 23 SEP 11
LOGGED BY: ACJ

WEATHER:
EXCAVATION METHOD:
LOCATION: SOUTH STACKED RESTORY, SOUTH SIDE, ON ROAD

Start Time: 2:35 PM End Time: 3:15PM Note:



NOTES/SAMPLES

2 5 GAL BUCKETS.
0'-20' MAT (4)

SOIL TYPE	SOIL DESCRIPTION
(1)	FILL,

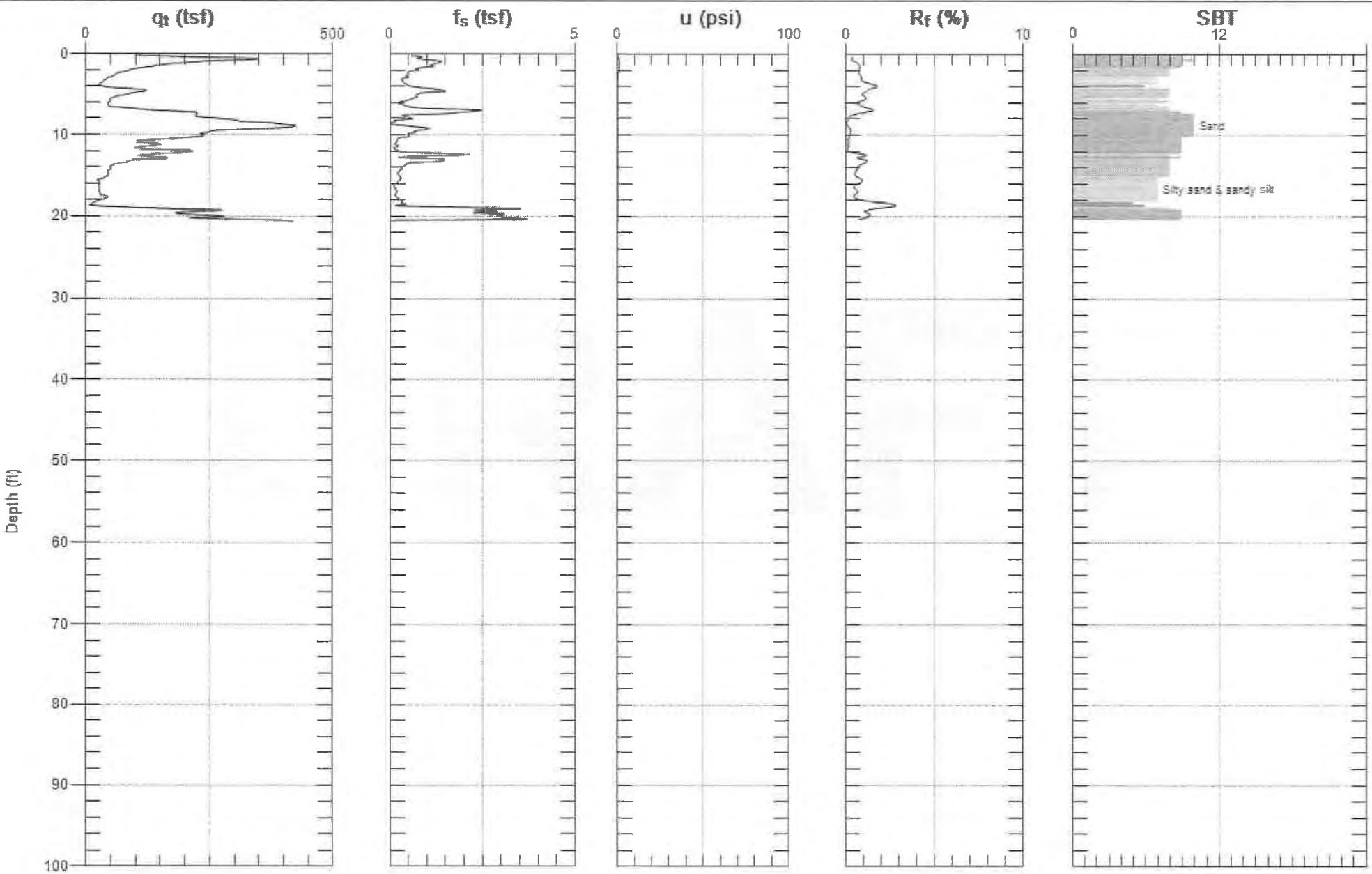
CPT Logs

GREGG

AECI

Site: RICO ST LUIS DRYING CE **Engineer: C. SANCHEZ**

Sounding: CPT-ADFR-01 **Date: 11/1/2011 01:59**



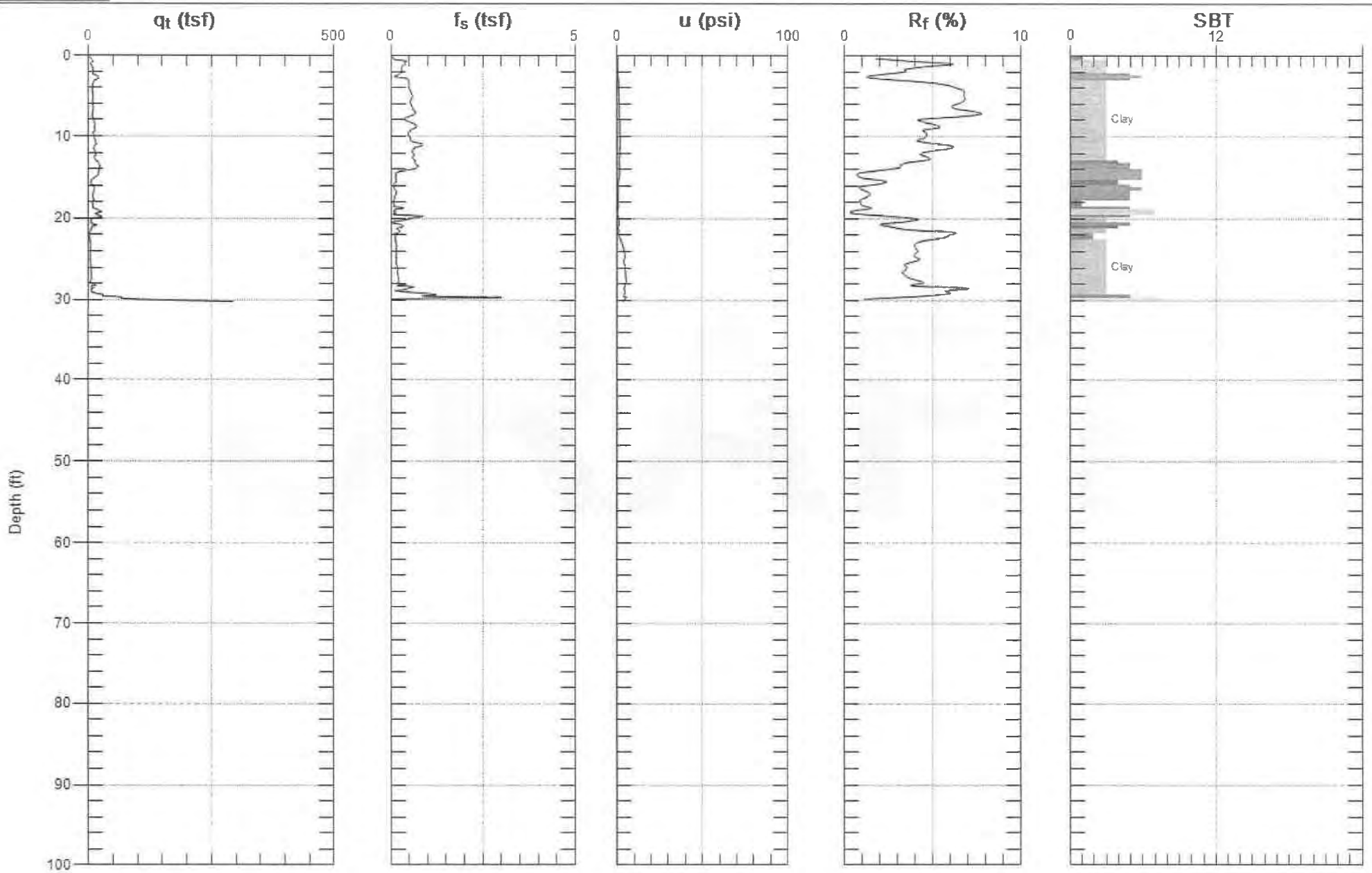
Max. Depth: 20.669 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG **AECI**

Site: RICO ST LUIS DRYING CE **Engineer: C. SANCHEZ**

Sounding: CPT-ADFR-01A **Date: 11/1/2011 02:32**



Max. Depth: 30.184 (ft)
Avg. Interval: 0.328 (ft)

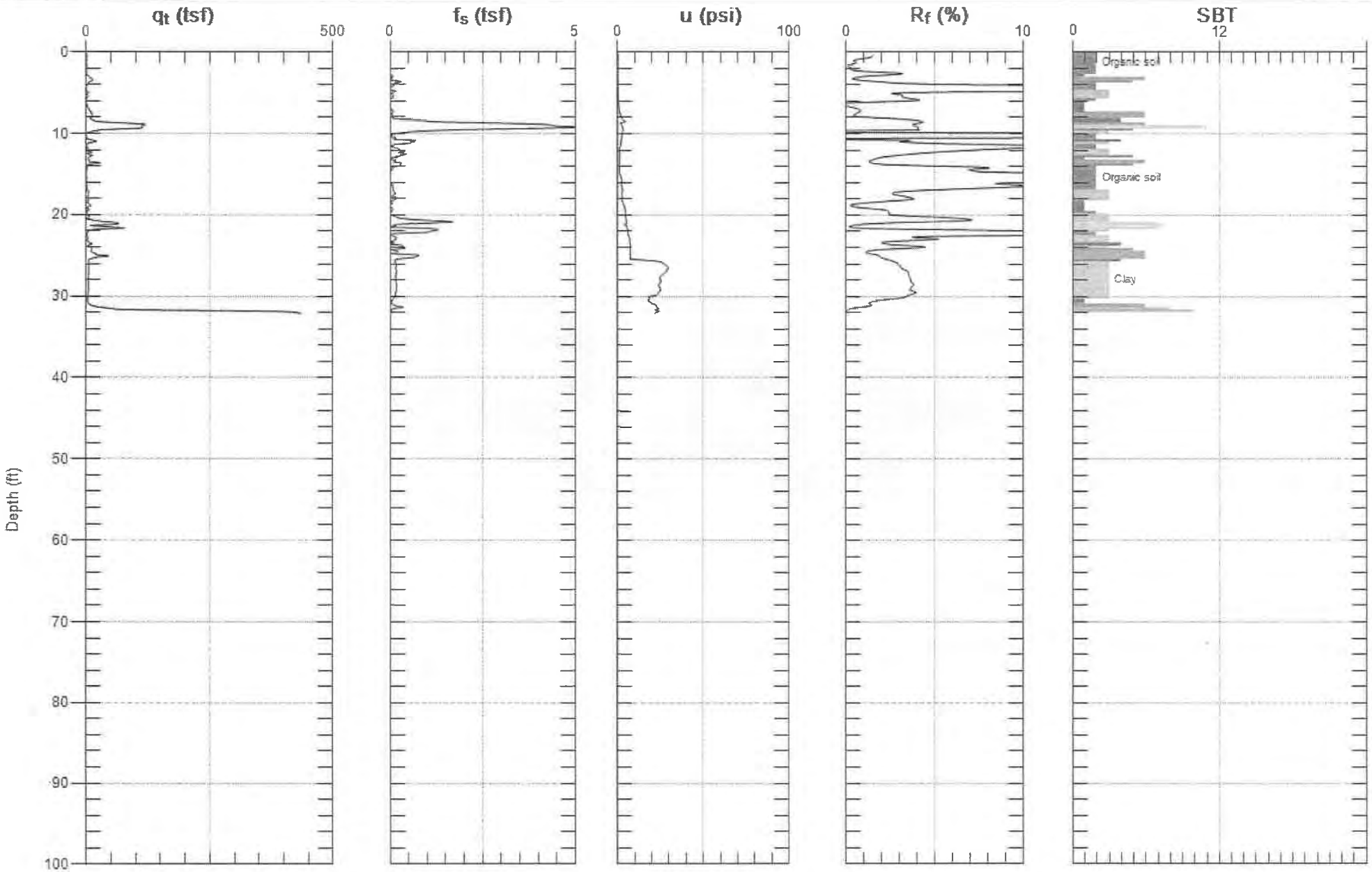
SBT: Soil Behavior Type (Robertson 1990)

GREGG

AECI

Site: RICO ST LUIS DRYING CE[illegible] Engineer: C. SANCHEZ

Sounding: CPT-ADFR-02 Date: 11/1/2011 12:53



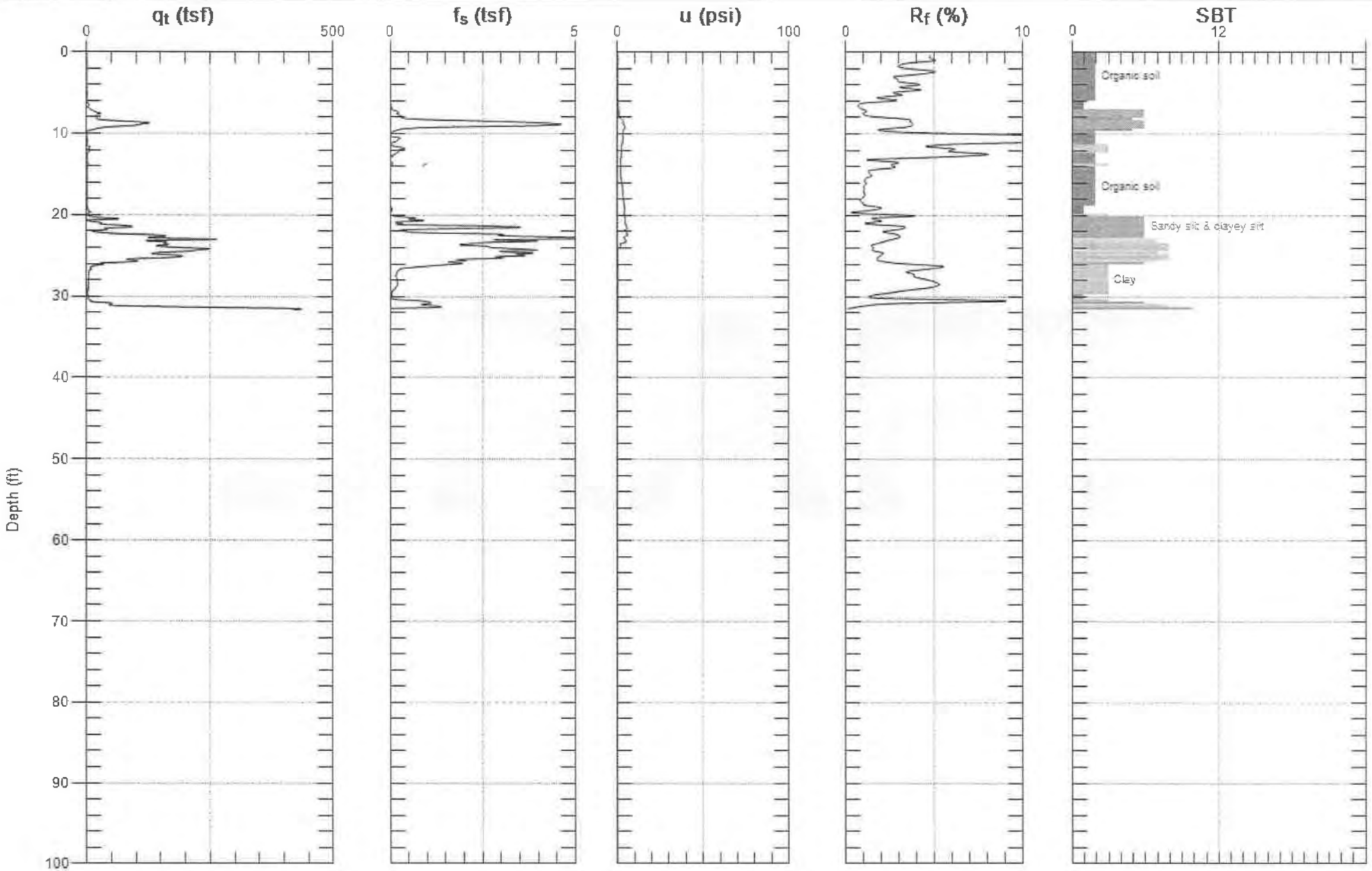
Max. Depth: 32.152 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG **AECI**

Site: RICO ST LUIS DRYING CE Engineer: C. SANCHEZ

Sounding: CPT-ADFR-02A Date: 11/1/2011 01:28



Max. Depth: 31.660 (ft)
Avg. Interval: 0.328 (ft)

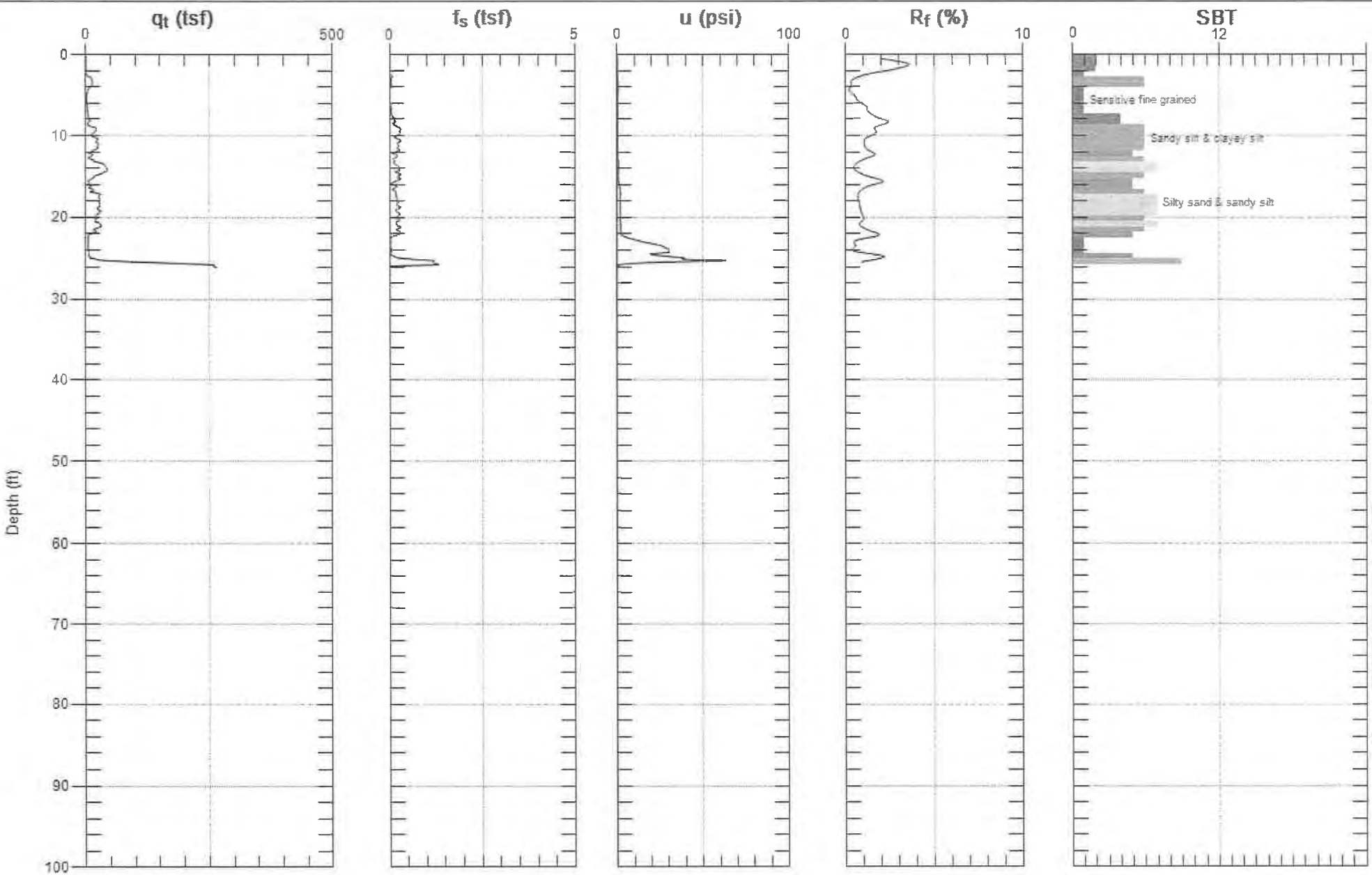
SBT: Soil Behavior Type (Robertson 1990)

GREGG

AECI

Site: RICO ST LUIS DRYING CE Engineer: C. SANCHEZ

Sounding: CPT-01 Date: 10/31/2011 03:51



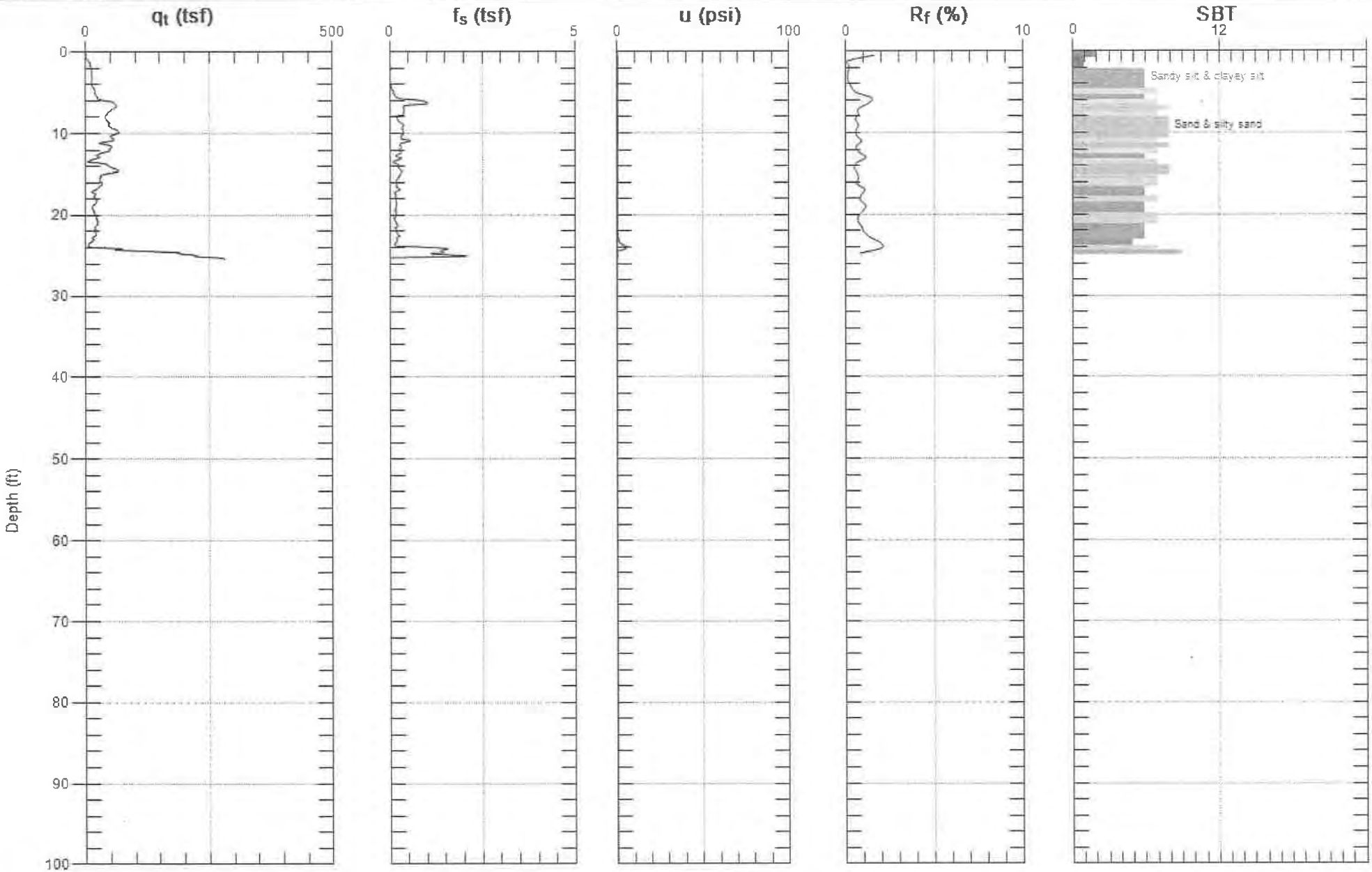
Max. Depth: 26.083 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG **AECI**

Site: RICO ST LUIS DRYING CE Engineer: C. SANCHEZ

Sounding: CPT-02 Date: 10/31/2011 02:50



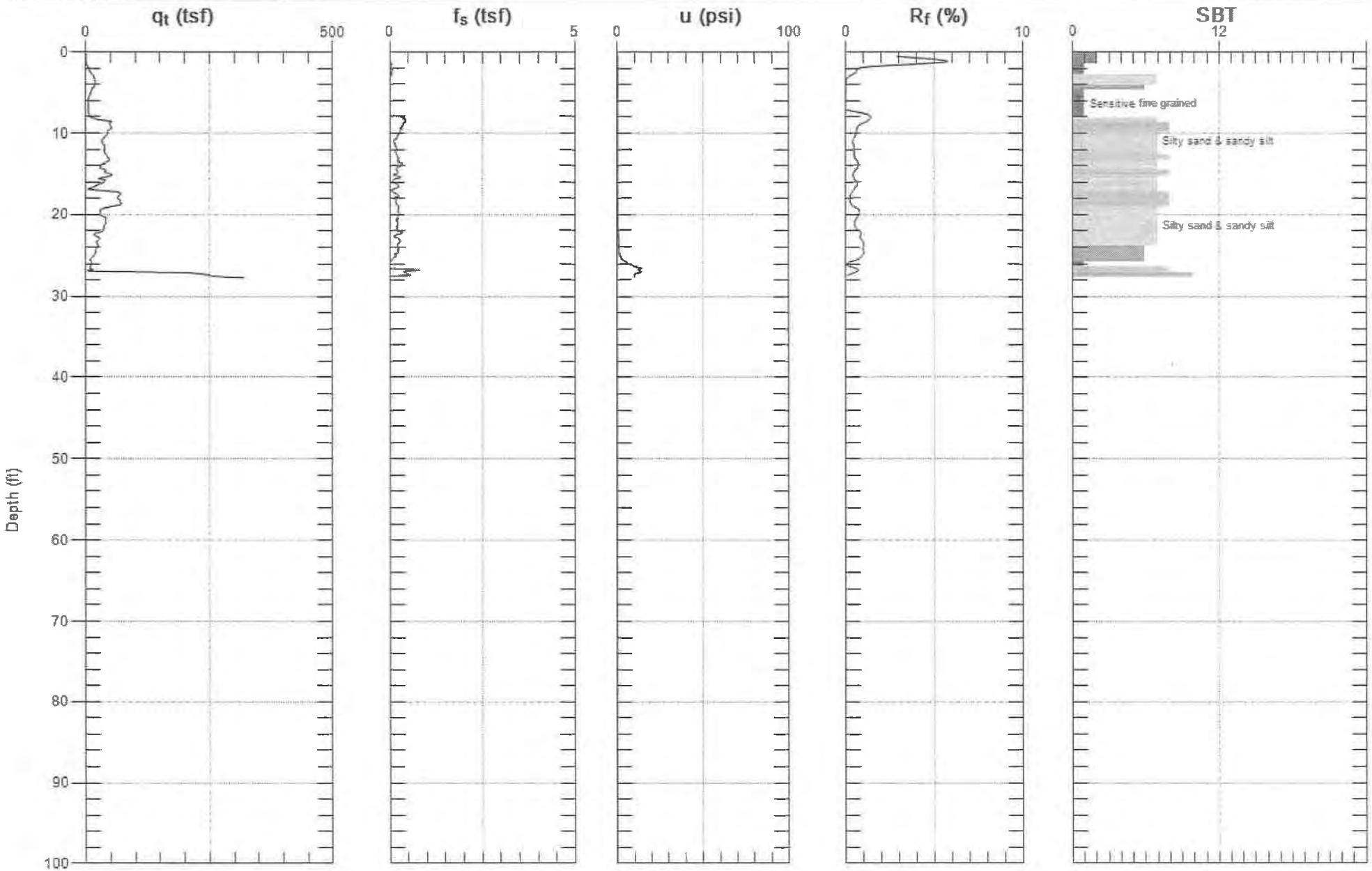
Max. Depth: 25.427 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG **AECI**

Site: RICO ST LUIS DRYING CE **Engineer: C. SANCHEZ**

Sounding: CPT-03 **Date: 10/31/2011 03:24**



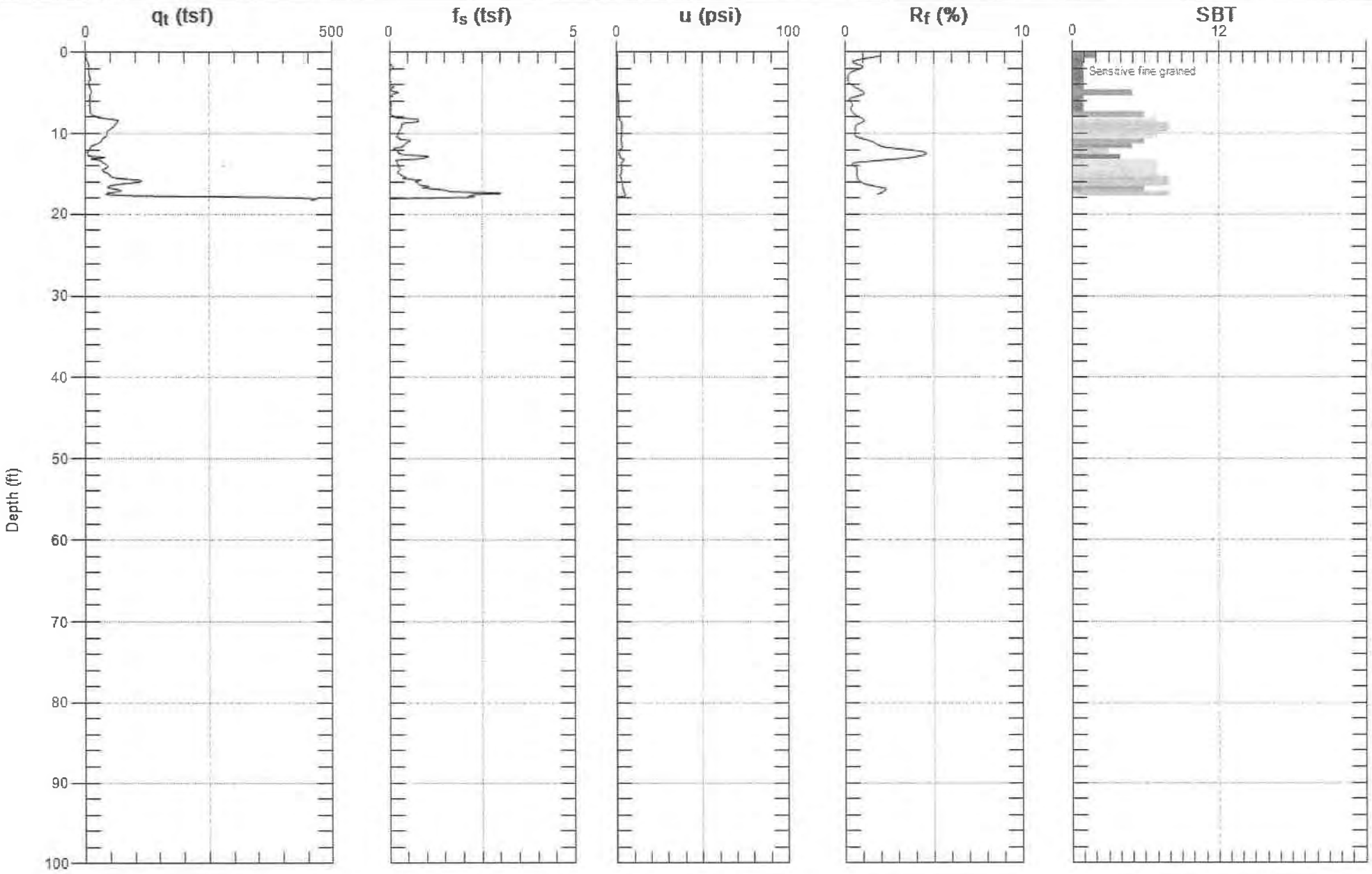
Max. Depth: 27.723 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG **AECI**

Site: RICO ST LUIS DRYING CE Engineer: C. SANCHEZ

Sounding: CPT-04 Date: 11/1/2011 08:03



Max. Depth: 18.209 (ft)
Avg. Interval: 0.656 (ft)

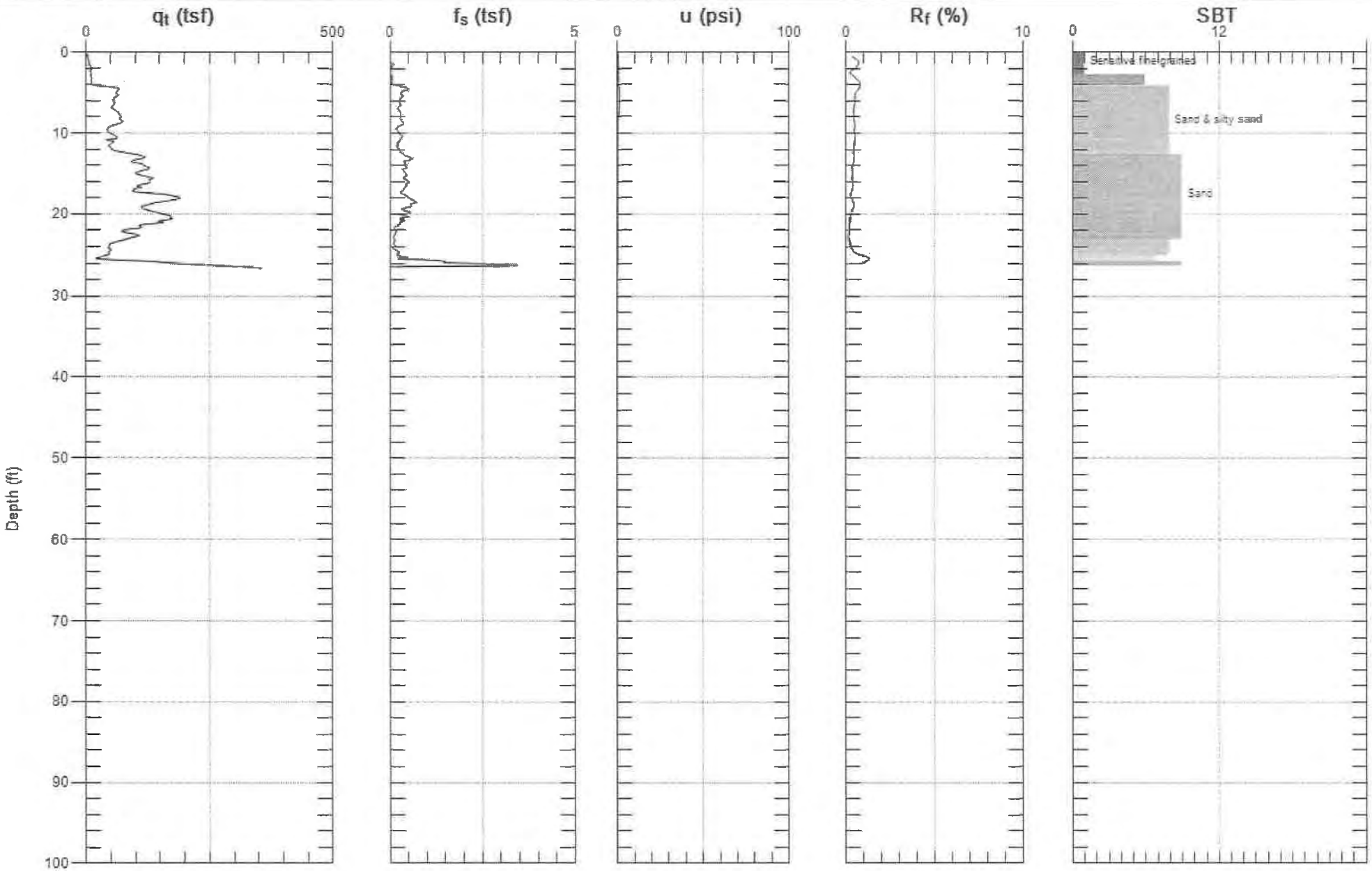
SBT: Soil Behavior Type (Robertson 1990)

GREGG

AECI

Site: RICO ST LUIS DRYING CE Engineer: C. SANCHEZ

Sounding: CPT-05 Date: 11/1/2011 07:42



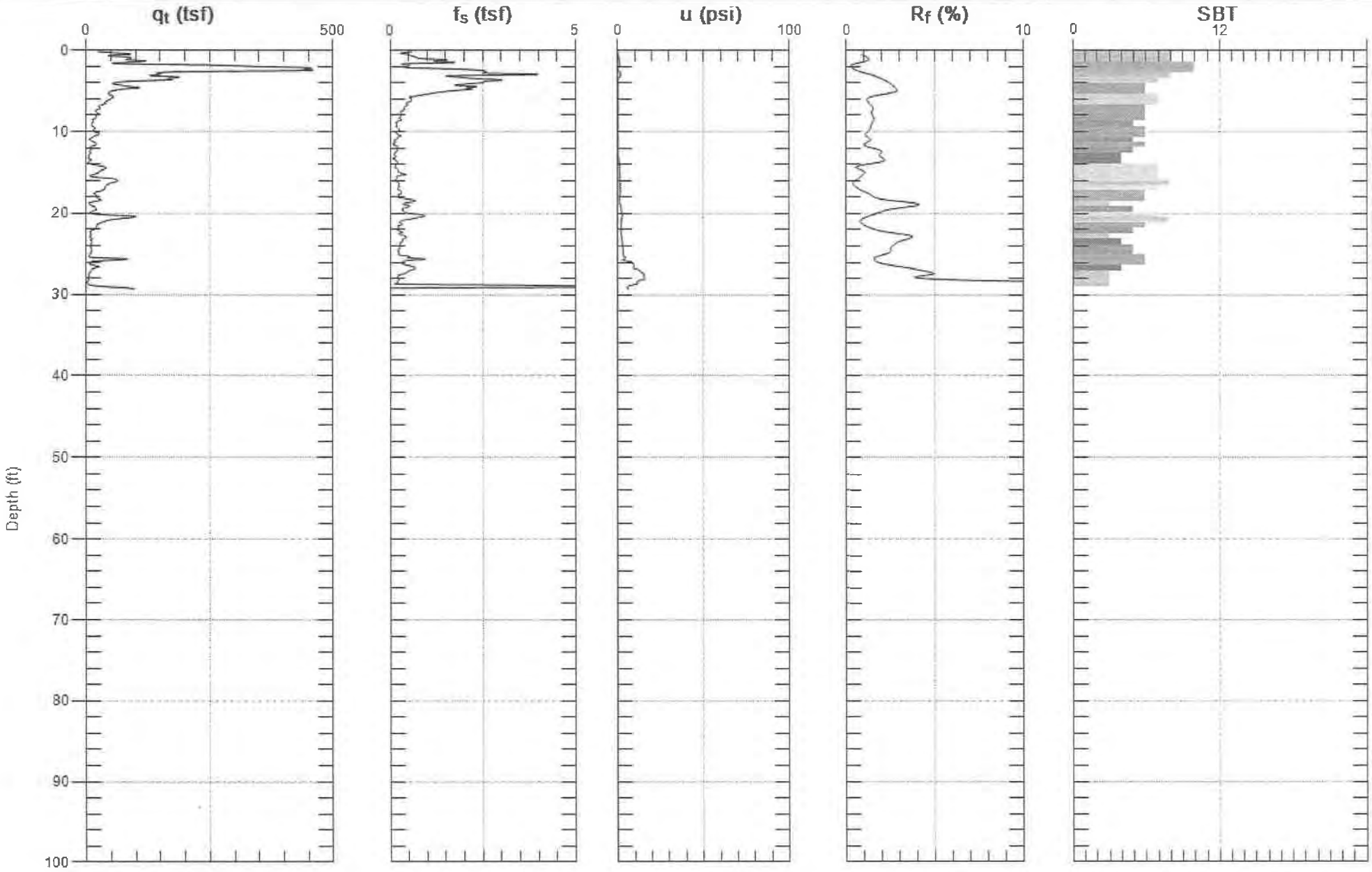
Max. Depth: 26.575 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG **AECI**

Site: RICO ST LUIS DRYING CEEngineer: C. SANCHEZ

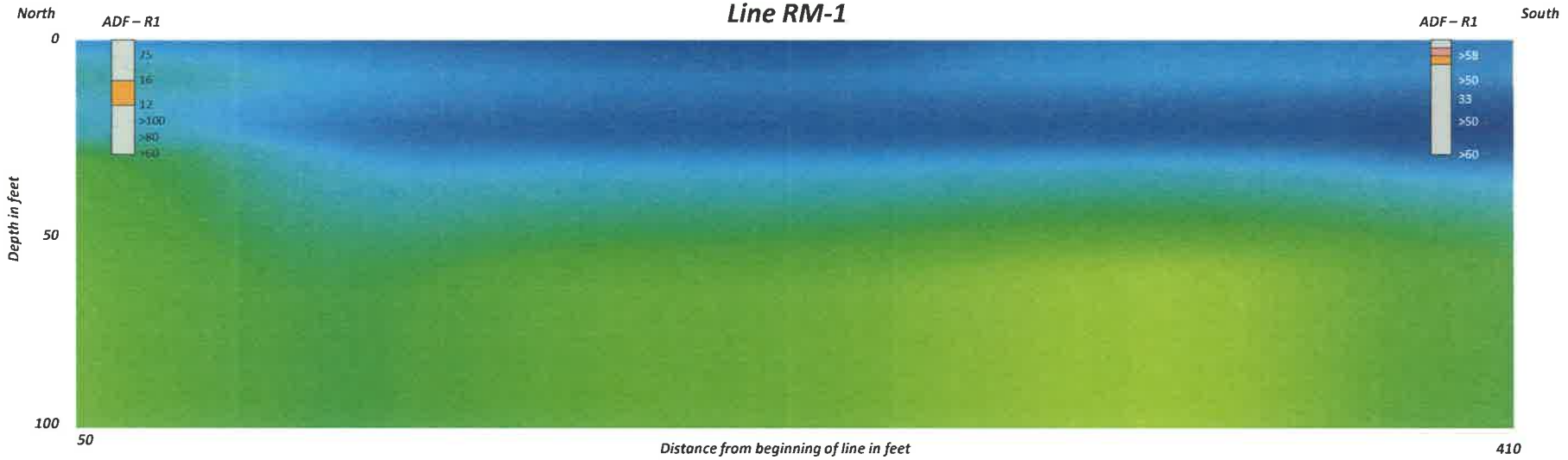
Sounding: CPT-06 Date: 10/31/2011 01:31

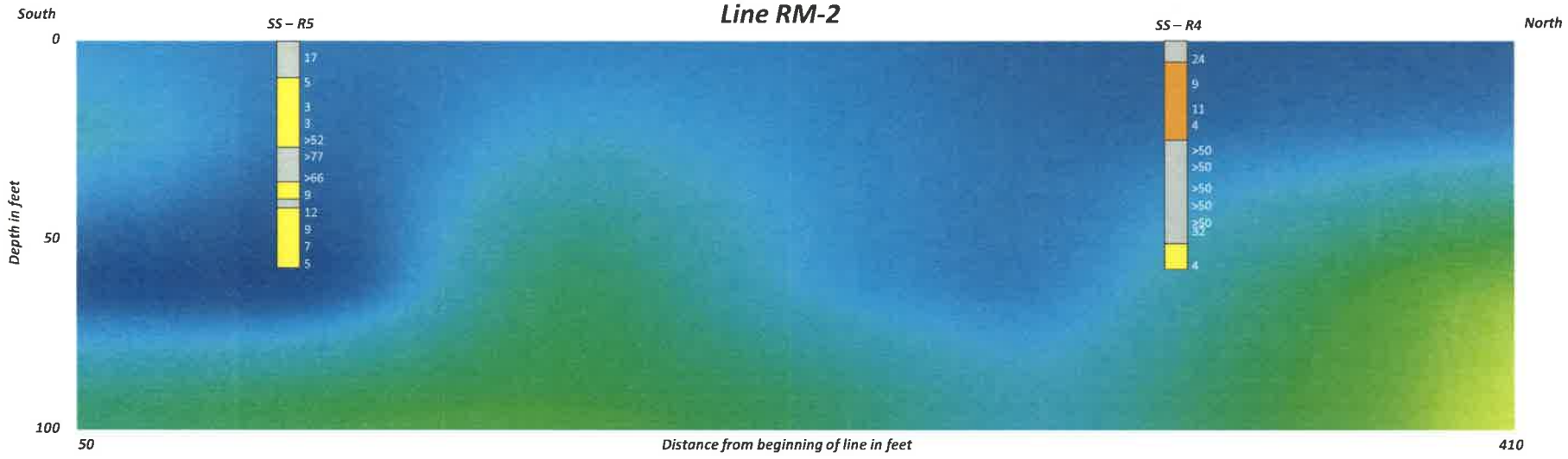


Max. Depth: 29.364 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

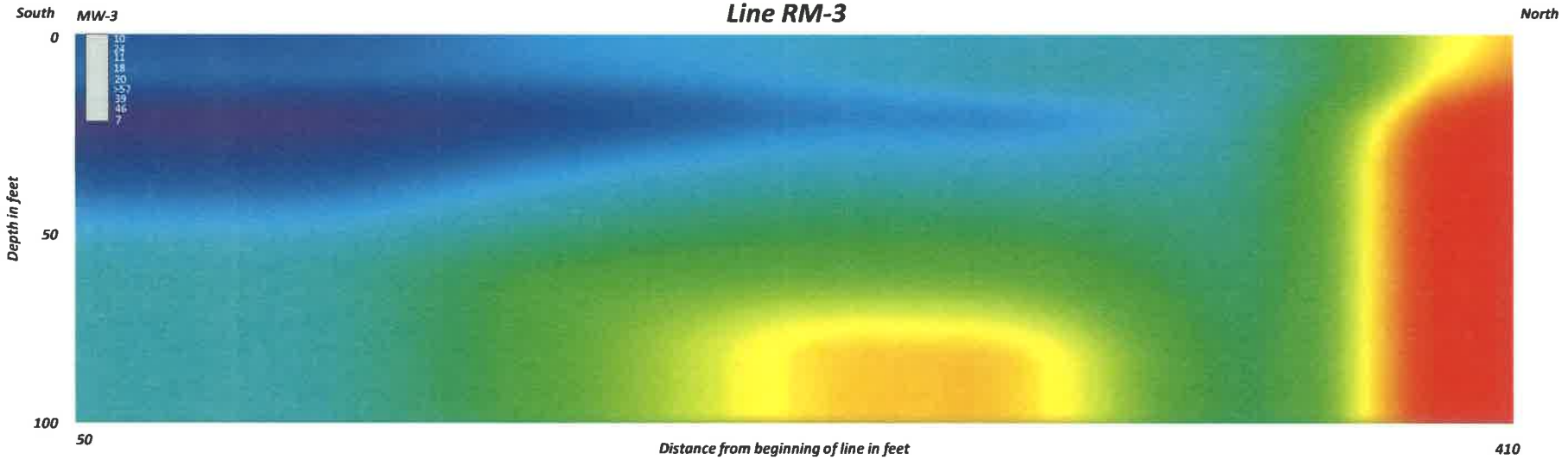
Refraction Microtremor Logs


Line RM-1
North
South
ADF – R1
ADF – R1
0
50
100
Depth in feet
75
16
12
>100
>80
>60
>58
>50
33
>50
>60
50
Distance from beginning of line in feet
410

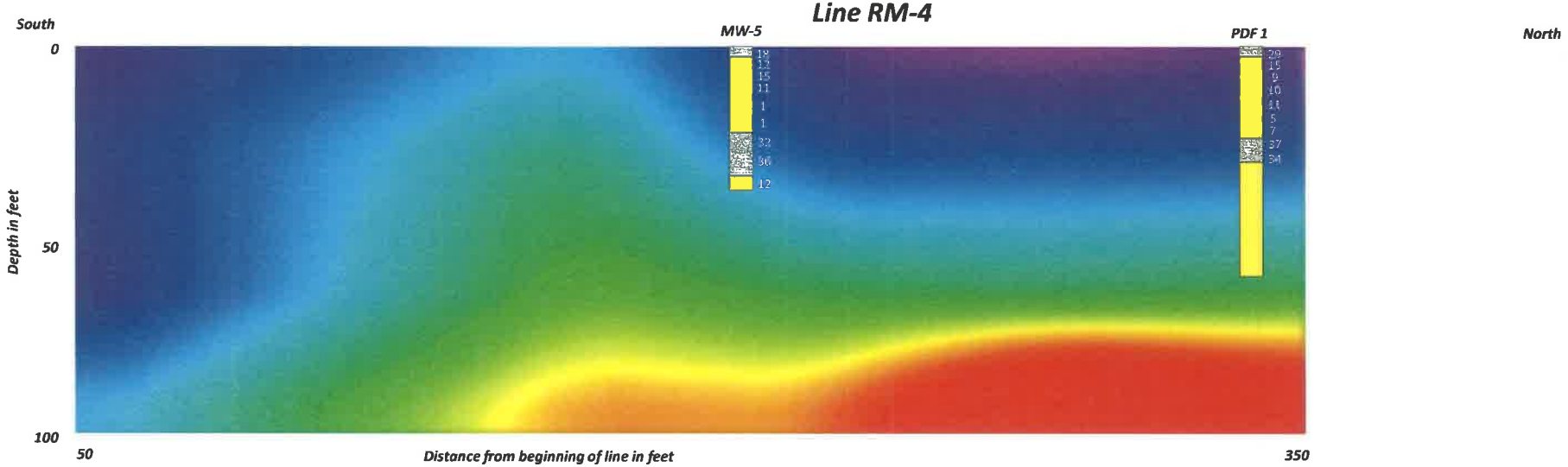

Line RM-2
South
North
SS – R5
SS – R4
0
50
100
Depth in feet
17
5
3
3
>52
>77
>66
9
12
9
7
5
24
9
11
4
>50
>50
>50
>50
>50
32
4
50
Distance from beginning of line in feet
410


Potentially liquefiable
Silt/Clay
Silty/Clayey Gravel
Calcine Tailings
Sand/Silty sand

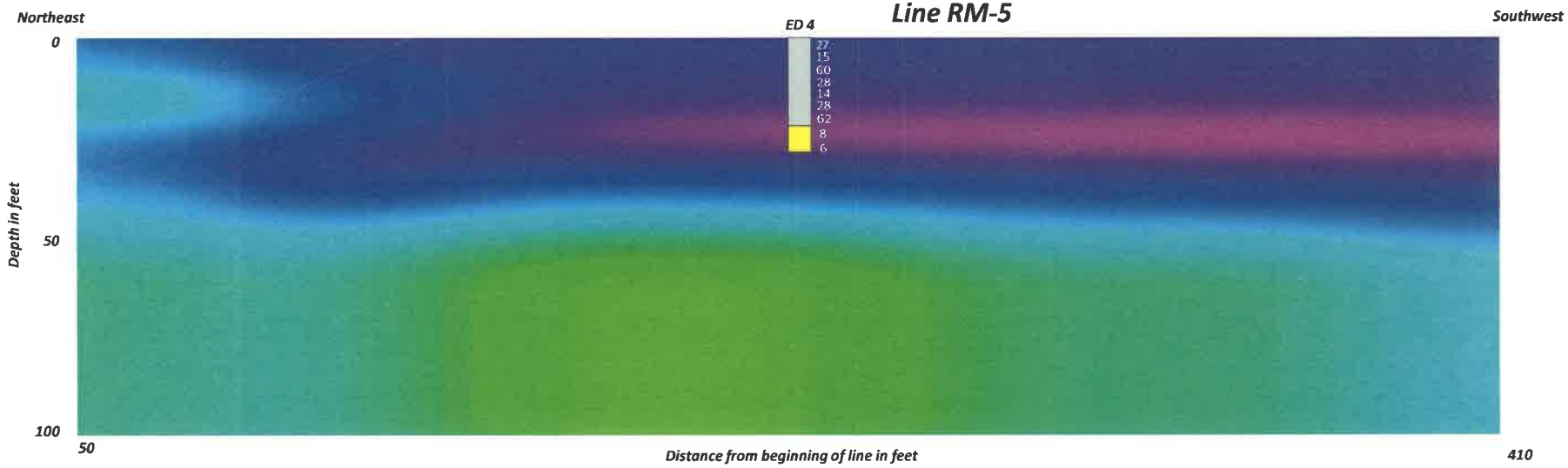
Line RM-3



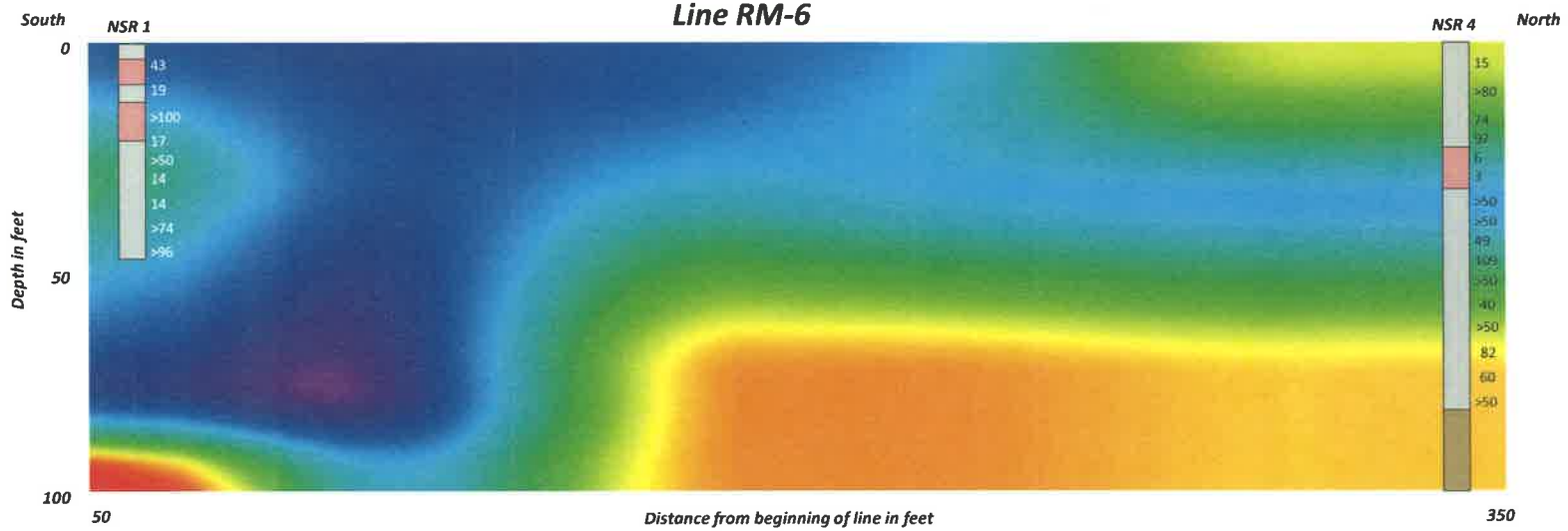
Line RM-4



Line RM-5



Line RM-6



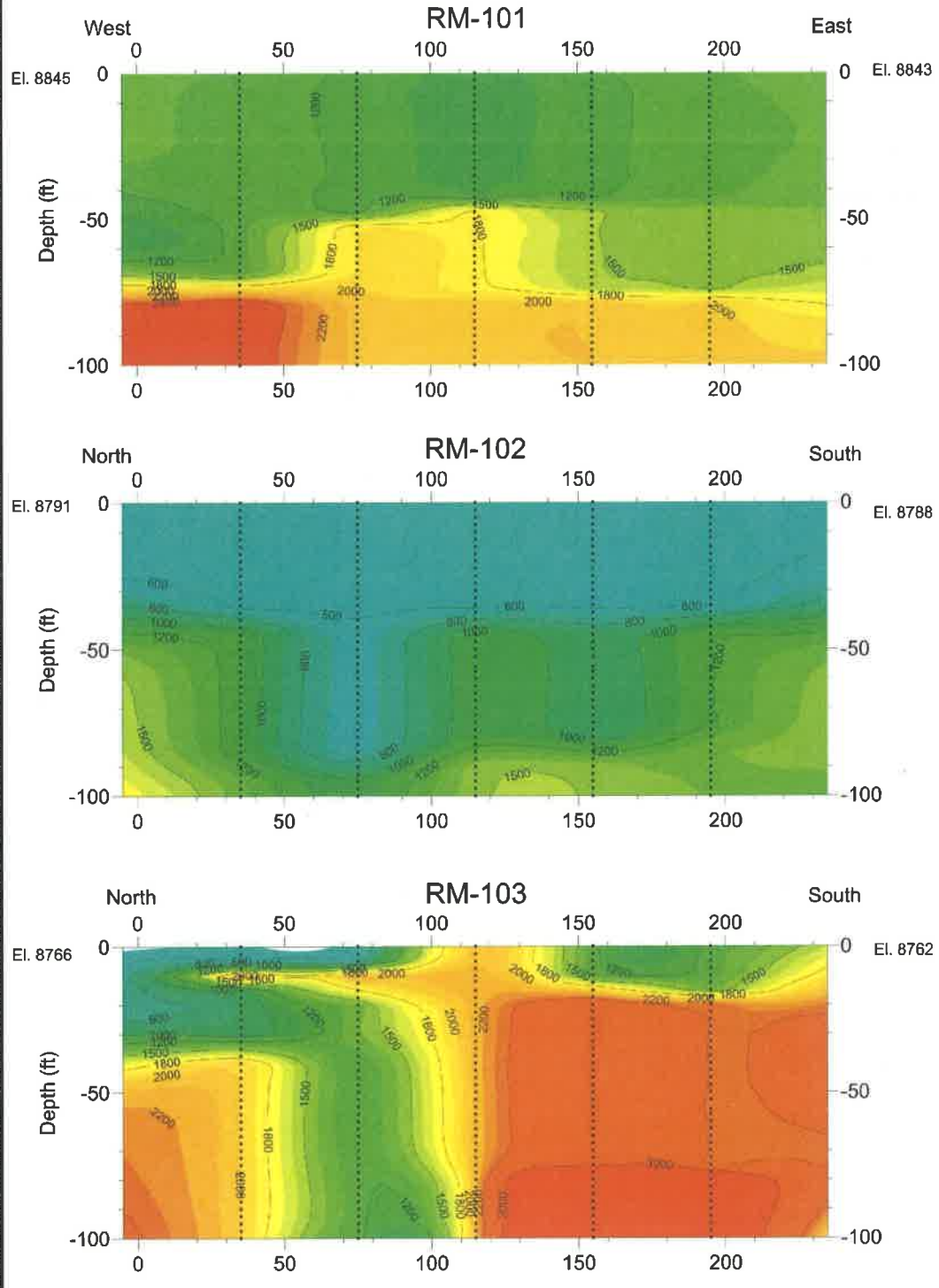
Silt/Clay

Silty/Clayey Gravel

Calcine Tailings

Sand/Silty sand

Dolomite



RICO-ARGENTINE SITE-OU01

2012 ENGINEERING GEOLOGIC AND GEOTECHNICAL FIELD INVESTIGATIONS

FIGURE X - 2012 ReMi PROFILES

AECOM

MAY 2013

60239806

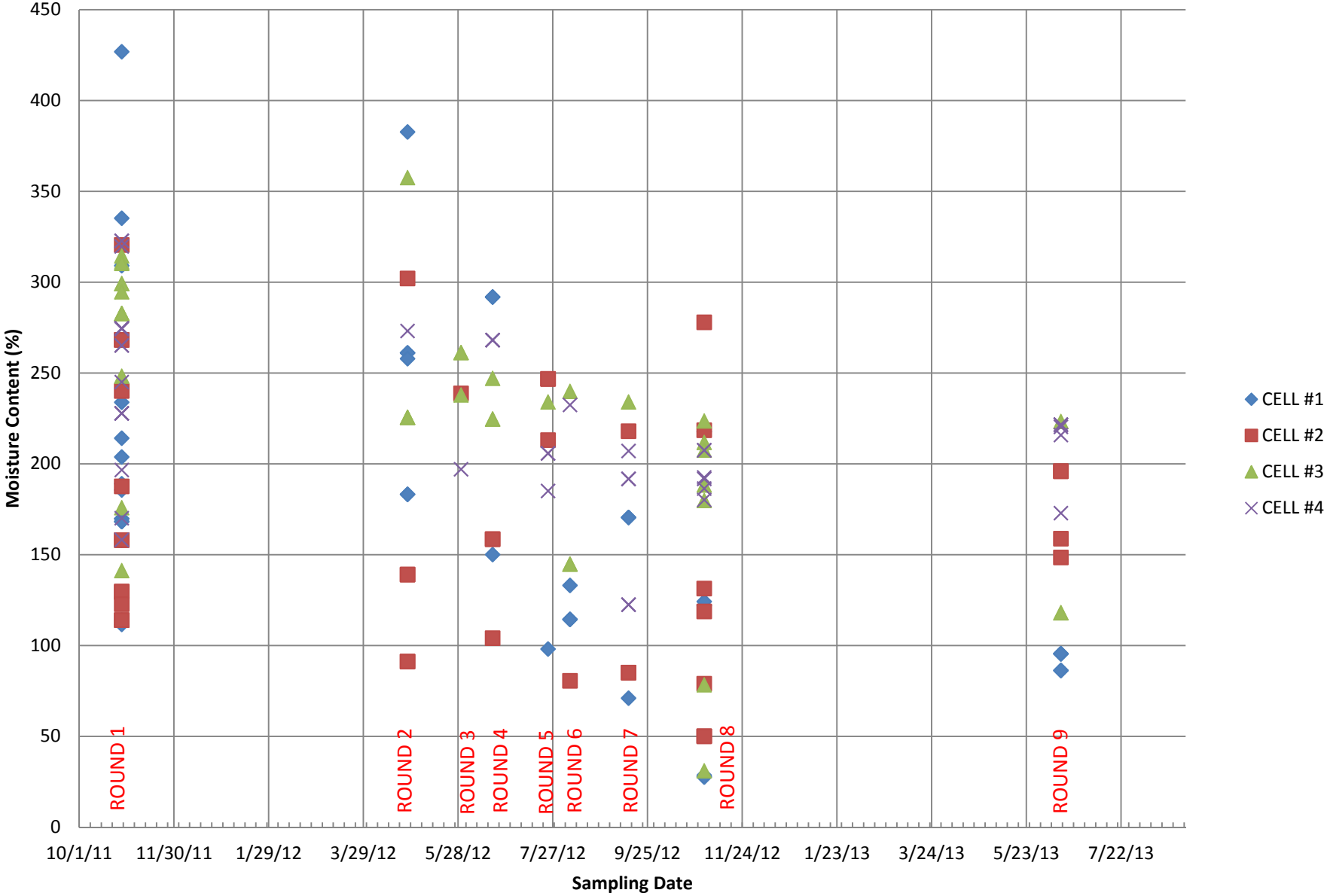
PRELIMINARY

Appendix B

IDF Solids - Laboratory Results

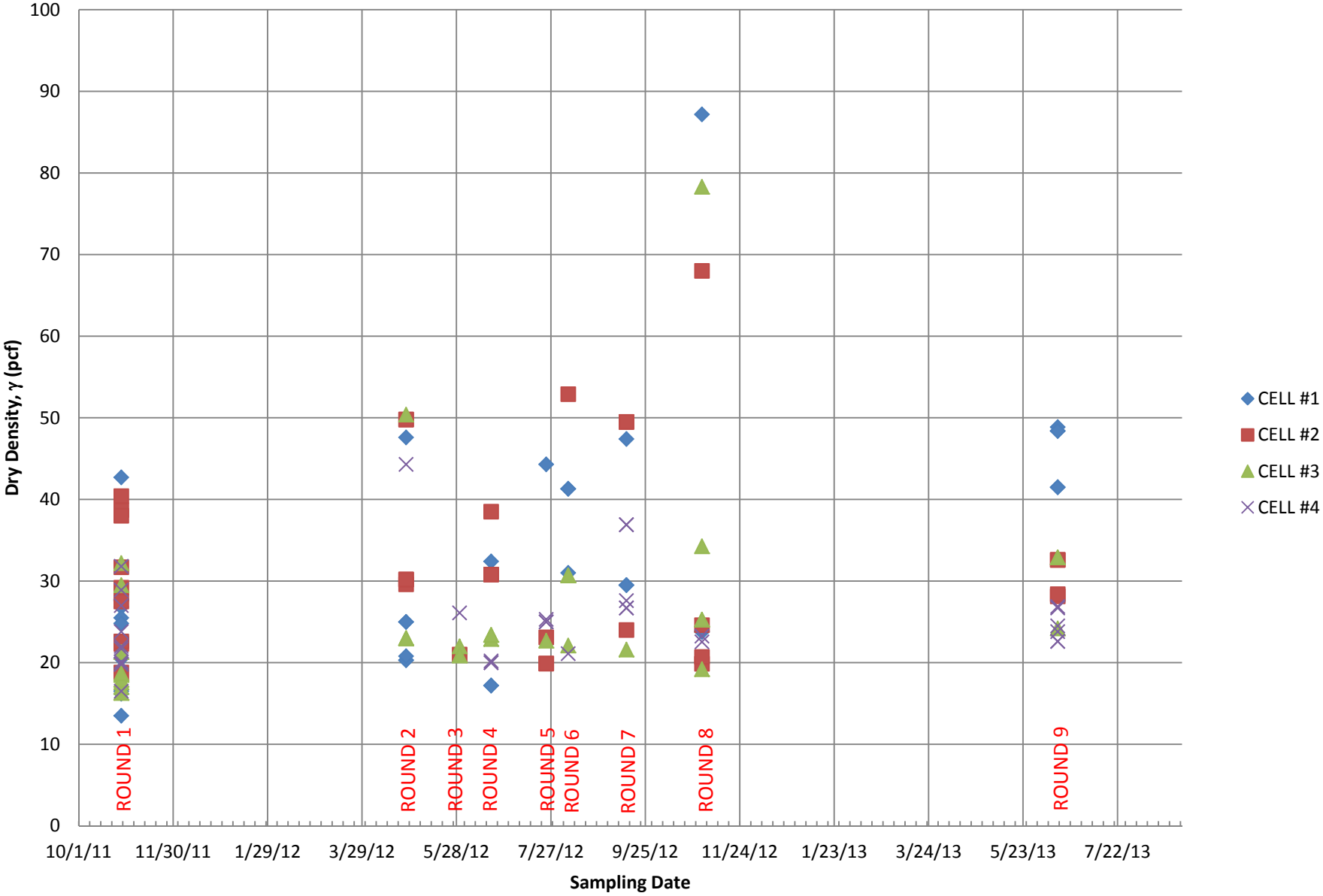
Rico Argentine Mine Site
AECOM Proj No.: 60239818

Figure B-1 Moisture Content Vs. Time



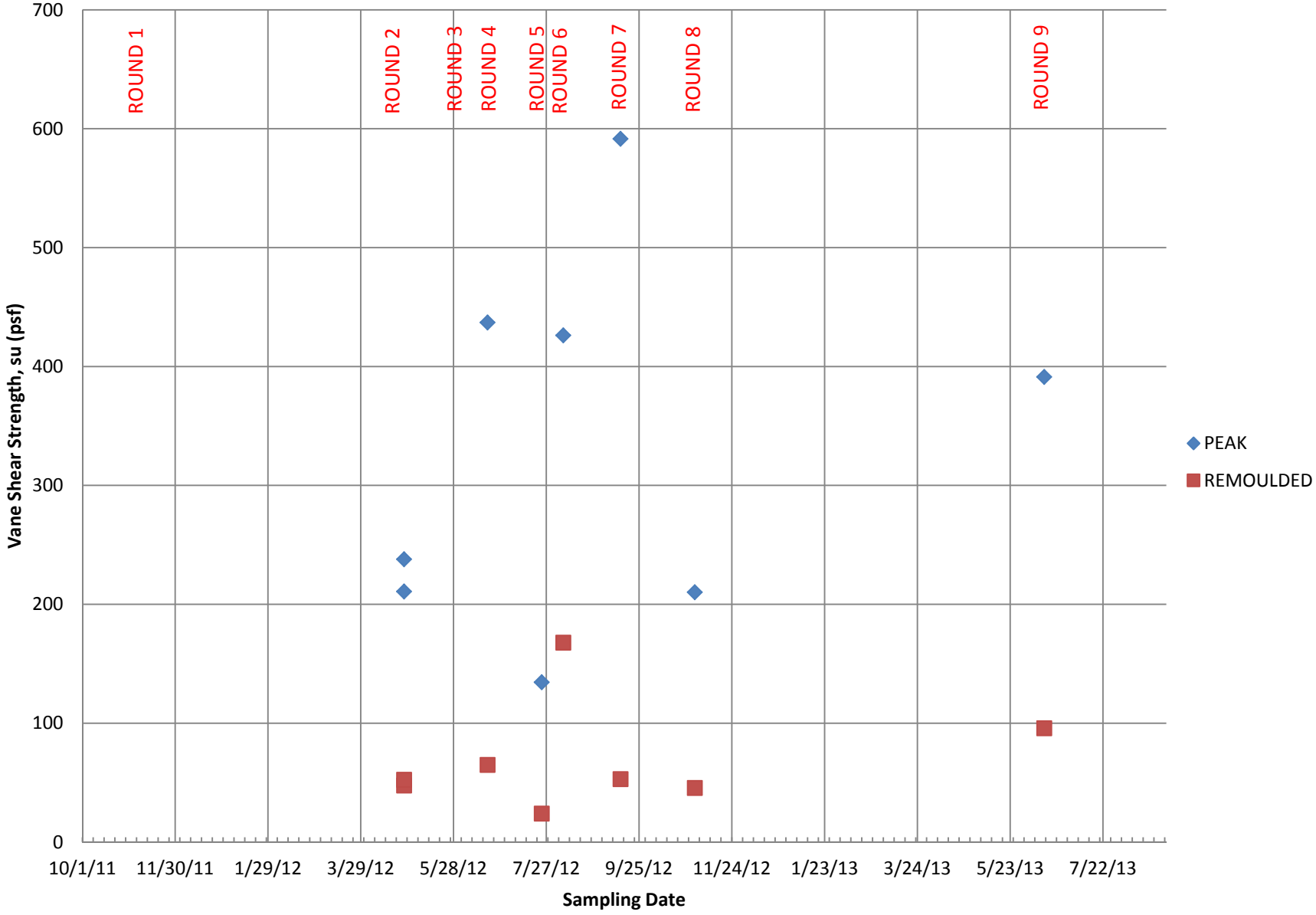
Rico Argentine Mine Site
AECOM Proj No.: 60239818

Figure B-2 Dry Density Vs. Time



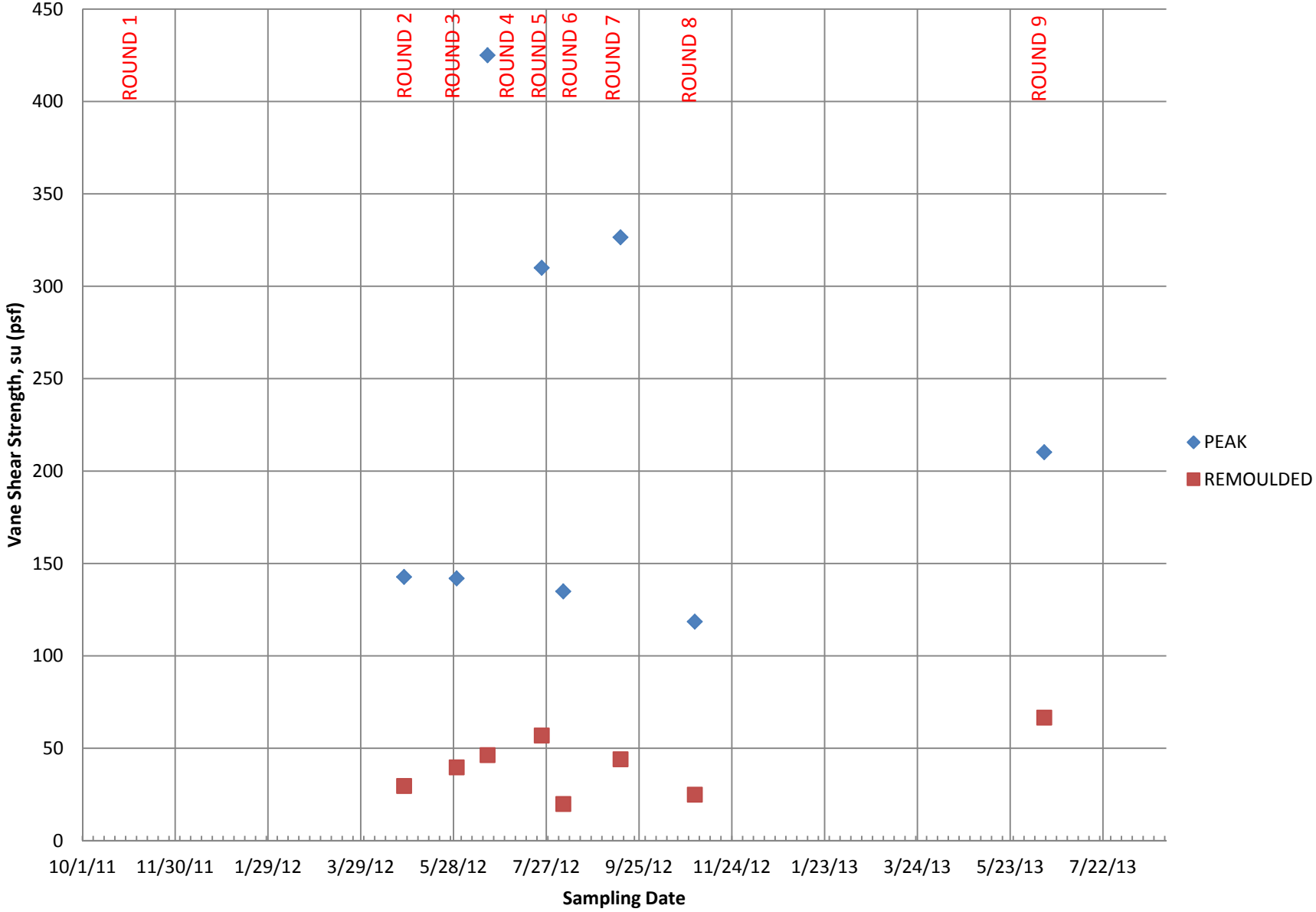
Rico Argentine Mine Site
AECOM Proj No.: 60239818

Figure B-3 Vane Shear Strength Vs. Time (Cell #1)



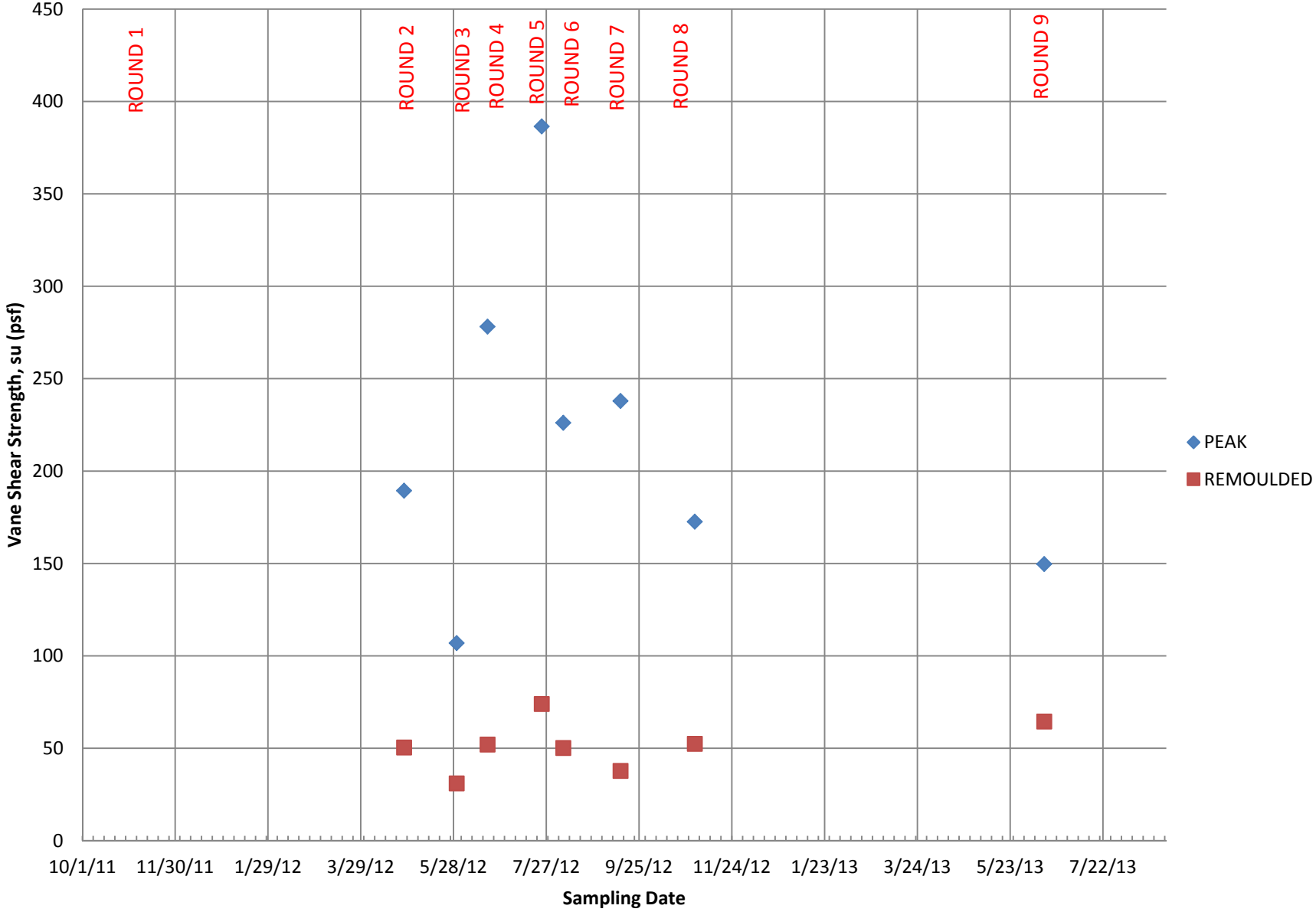
Rico Argentine Mine Site
AECOM Proj No.: 60239818

Figure B-3 Vane Shear Strength Vs. Time (Cell #2)



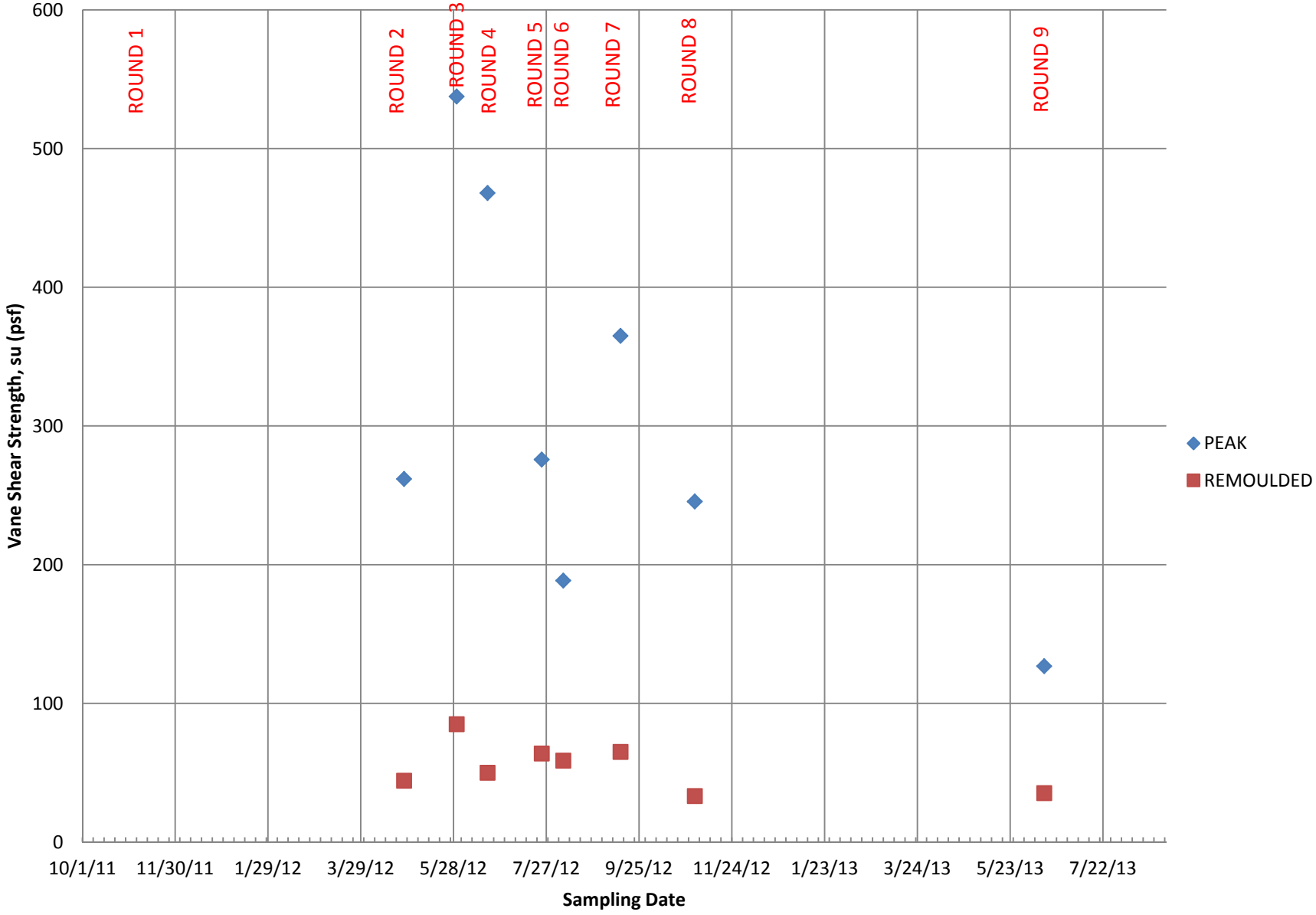
Rico Argentine Mine Site
AECOM Proj No.: 60239818

Figure B-3 Vane Shear Strength Vs. Time (Cell #3)



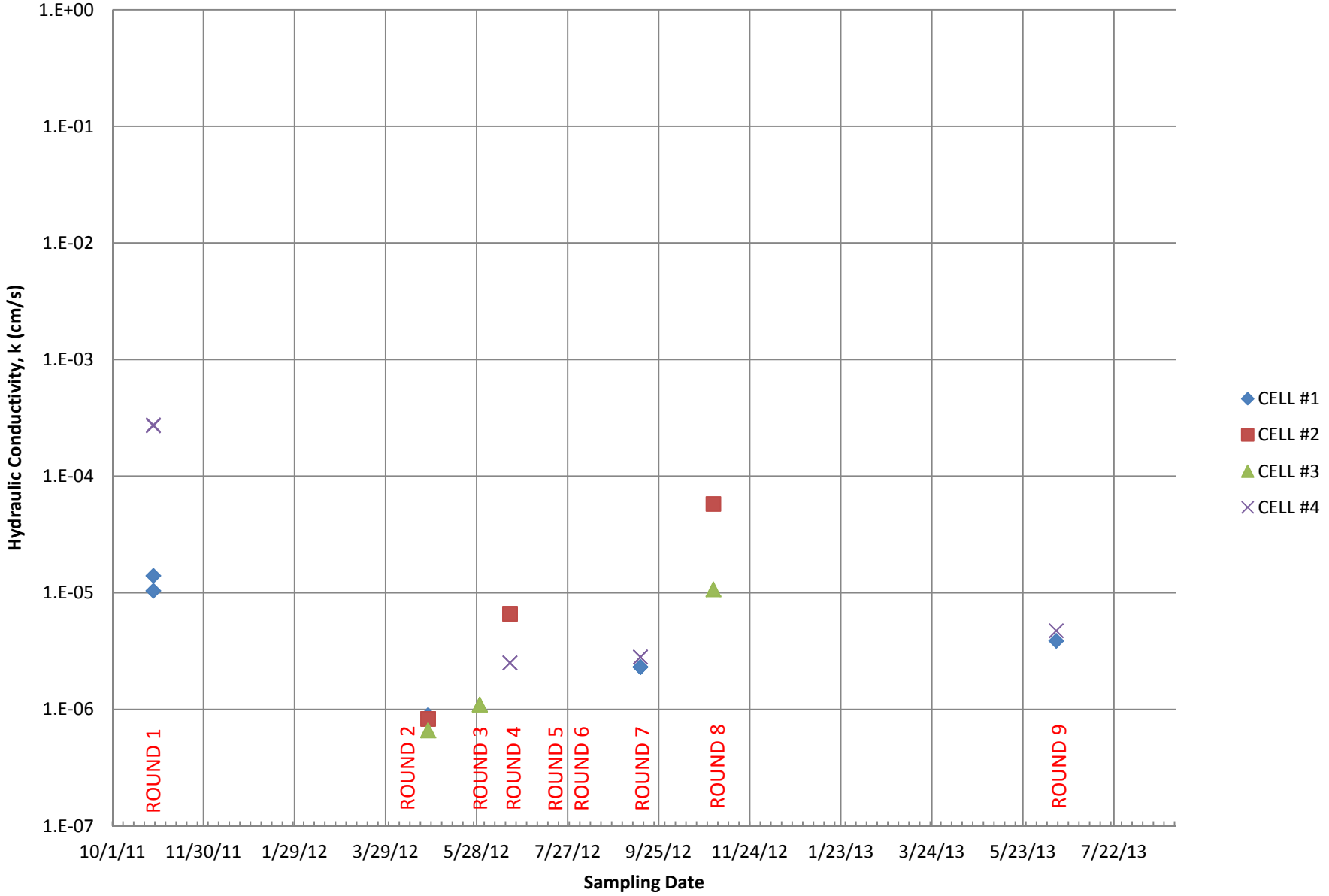
Rico Argentine Mine Site
AECOM Proj No.: 60239818

Figure B-3 Vane Shear Strength Vs. Time (Cell #4)



Rico Argentine Mine Site
AECOM Proj No.: 60239818

Figure B-4 Hydraulic Conductivity Vs. Time



Appendix C

Stability Analysis Results

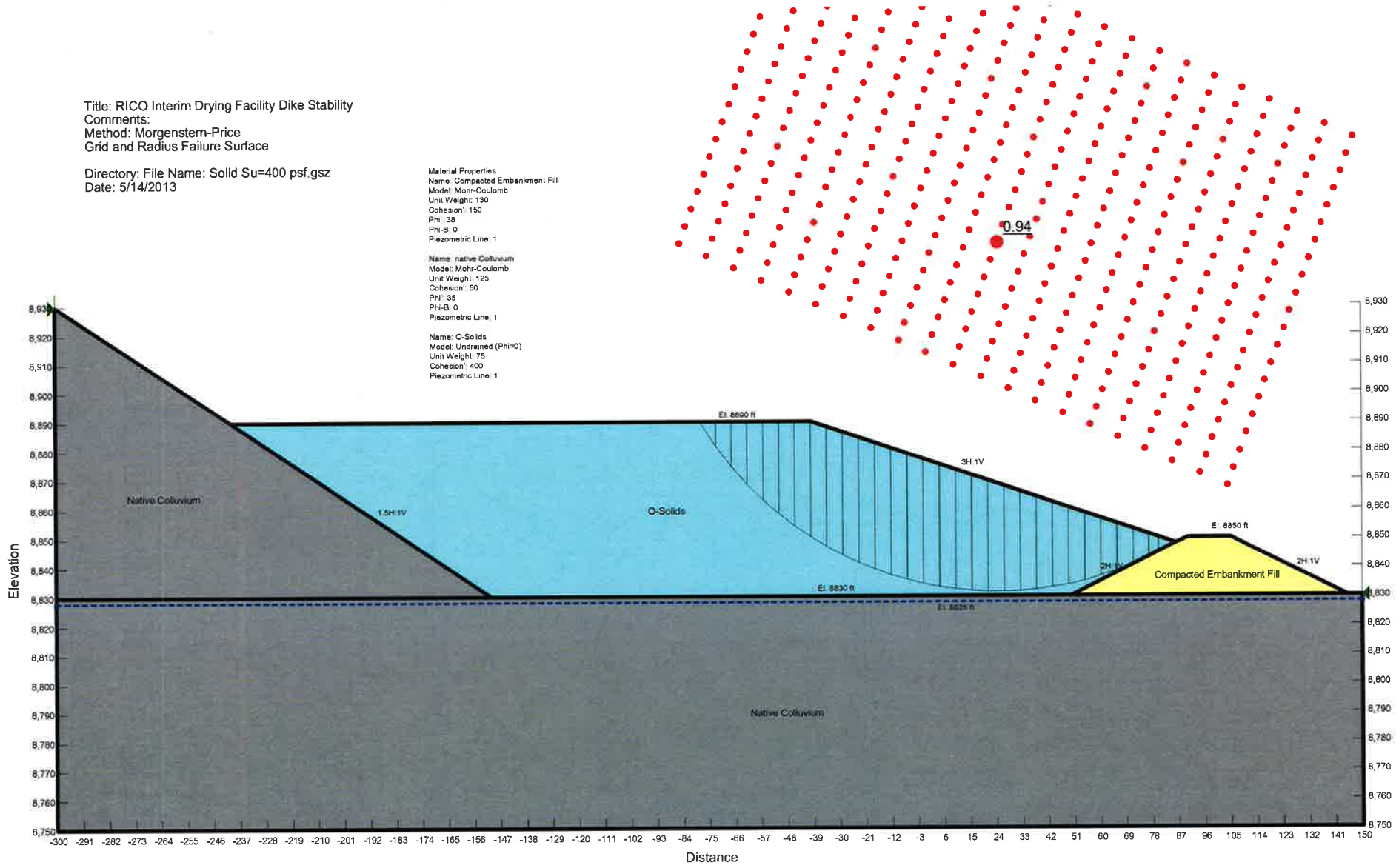
Title: RICO Interim Drying Facility Dike Stability
Comments:
Method: Morgenstern-Price
Grid and Radius Failure Surface

Directory: File Name: Solid Su=400 psf.gsz
Date: 5/14/2013

Material Properties
Name: Compacted Embankment Fill
Model: Mohr-Coulomb
Unit Weight: 130
Cohesion': 150
Phi': 38
Phi-B: 0
Piezometric Line: 1

Name: native Colluvium
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 50
Phi': 35
Phi-B: 0
Piezometric Line: 1

Name: O-Solids
Model: Undrained (Phi=0)
Unit Weight: 75
Cohesion': 400
Piezometric Line: 1



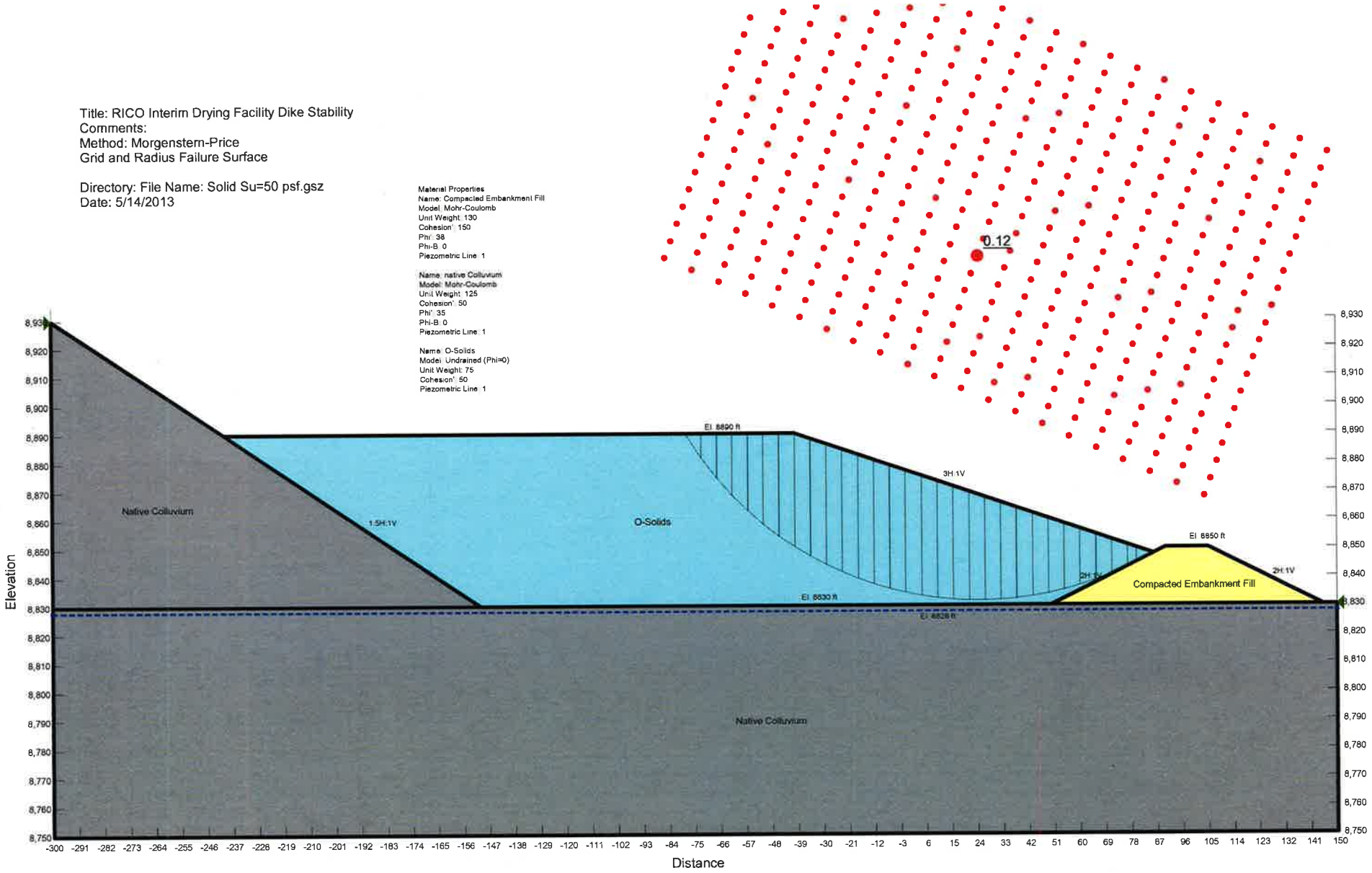
Title: RICO Interim Drying Facility Dike Stability
Comments:
Method: Morgenstern-Price
Grid and Radius Failure Surface

Directory: File Name: Solid Su=50 psf.gsz
Date: 5/14/2013

Material Properties
Name: Compacted Embankment Fill
Model: Mohr-Coulomb
Unit Weight: 130
Cohesion': 150
Phi': 38
Phi-B: 0
Piezometric Line: 1

Name: native Colluvium
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 50
Phi': 35
Phi-B: 0
Piezometric Line: 1

Name: O-Solids
Model: Undrained (Phi=0)
Unit Weight: 75
Cohesion': 50
Piezometric Line: 1



Title: RICO Interim Drying Facility Dike Stability
Comments:
Method: Morgenstern-Price
Grid and Radius Failure Surface

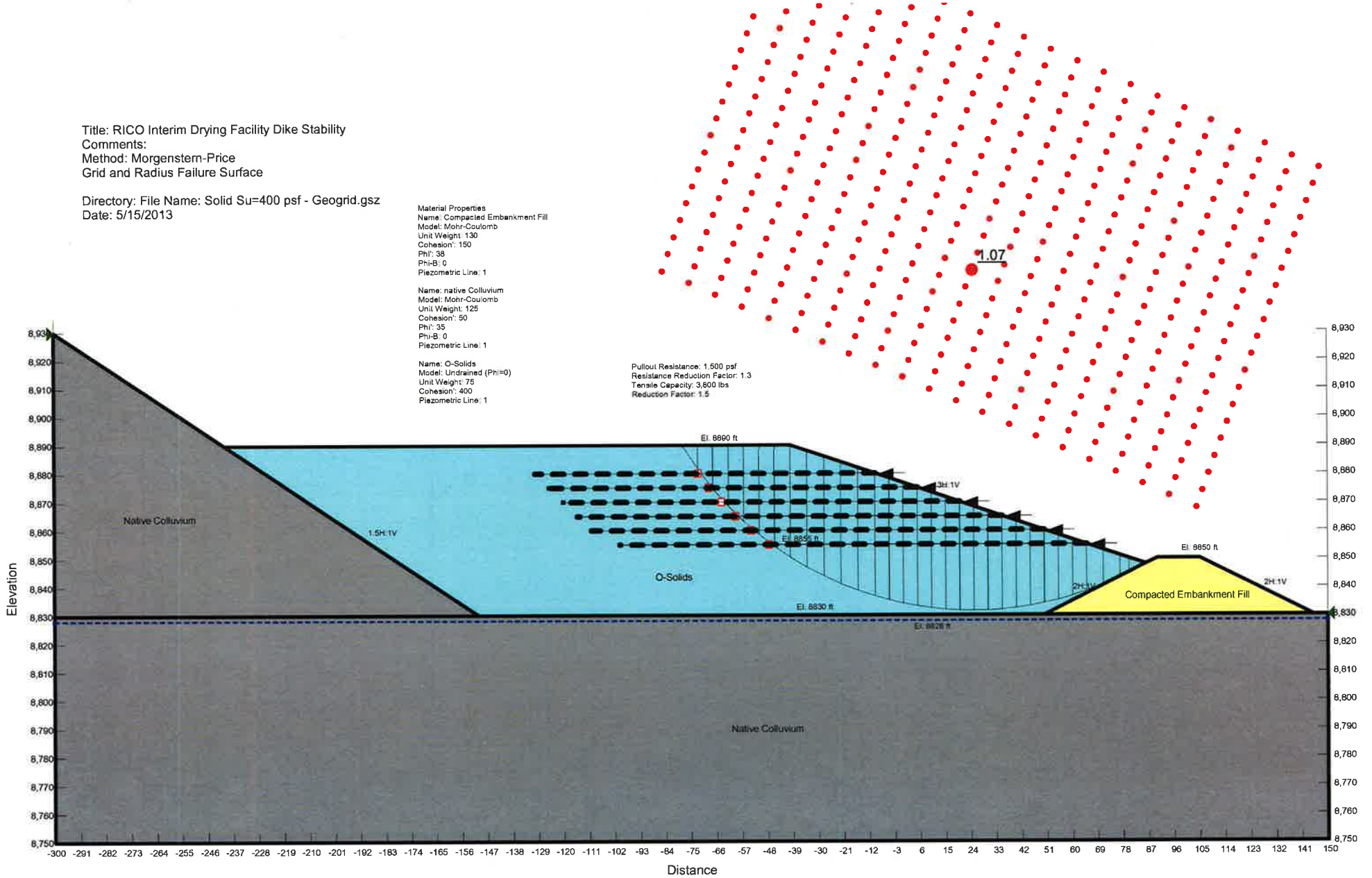
Directory: File Name: Solid Su=400 psf - Geogrid.gsz
Date: 5/15/2013

Material Properties
Name: Compacted Embankment Fill
Model: Mohr-Coulomb
Unit Weight: 130
Cohesion': 150
Phi': 38
Phi-B: 0
Piezometric Line: 1

Name: native Colluvium
Model: Mohr-Coulomb
Unit Weight: 125
Cohesion': 50
Phi': 35
Phi-B: 0
Piezometric Line: 1

Name: O-Solids
Model: Undrained (Phi=0)
Unit Weight: 75
Cohesion': 400
Piezometric Line: 1

Pullout Resistance: 1,500 psf
Resistance Reduction Factor: 1.3
Tensile Capacity: 3,600 lbs
Reduction Factor: 1.5



Title: RICO Interim Drying Facility Dike Stability
Comments:
Method: Morgenstern-Price
Grid and Radius Failure Surface

Directory: File Name: Solid Su=400 psf phi= 5 deg - Geogrid.gsz
Date: 5/15/2013